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Editorial and Executive Offices: 30 Church street, New York 7, and 79 W. Monroe street, Chicago 3. Branch offices: Terminal Tower, Cleveland 13; 1081 National Press bldg., Washington 4, D.C.; Terminal Sales bldg., Portland 5, Ore.; 1127 Wilshire blvd., Los Angeles 17, Cal.; 244 California St., San Francisco, Cal.; 2909 Maple avenue, Dallas 4, Tex.

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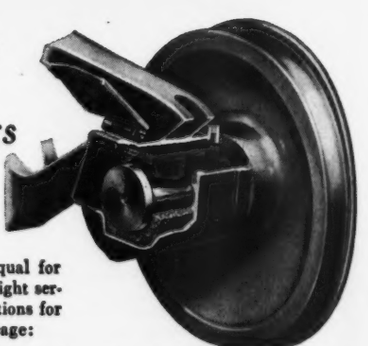
Here are some important maintenance facts about LOW-COST SOLID BEARINGS

Improving maintenance and inspection practices can shorten the gap between on-line and interchange performance of solid journal bearings



This simple solid journal bearing assembly has no equal for real economy in modern freight service. Here are a few suggestions for maximum trouble-free mileage:

1. Use oils of adequate film strength and stability.
2. Make sure waste meets AAR specifications.
3. Repack at specified 12-month intervals.
4. Inspect bearings *after* switching.
5. Train and supervise your maintenance crews.

Routine yard maintenance of solid journal bearings requires fewer man-hours, less skill, and simpler facilities than would be required for any high-cost roller bearing installation. That's true of both interchange and on-line service.

But for low-cost solid bearings to operate in interchange with the higher efficiency that's obtained on-line, it's important that maintenance and inspection practices be up to the standards required. Oils of greater film strength and stability are a primary need. Journal packing should, but often doesn't, meet AAR specifications.

And adequate on-job training to teach the hows and whys of doing the job right, can really pay off in reduced hot box and operating expense. One large railroad has recently initiated a program that calls for car foremen in freight yards to hold ½ hour instruction periods each week. Just watch this railroad's bearing performance improve! Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

MAGNUS

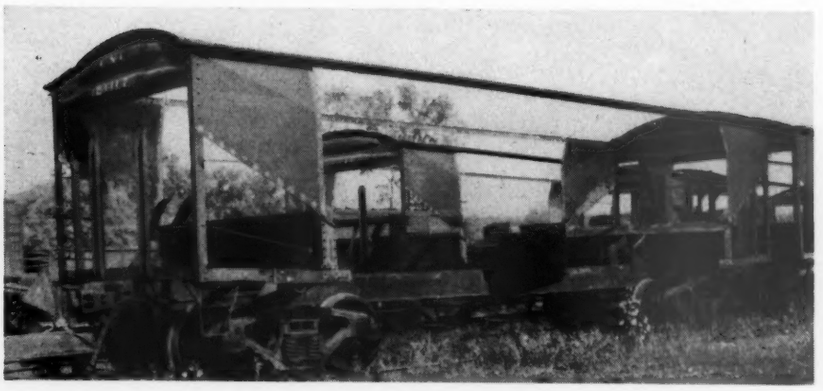
Solid Bearings

Right for Railroads

...in performance...in cost

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

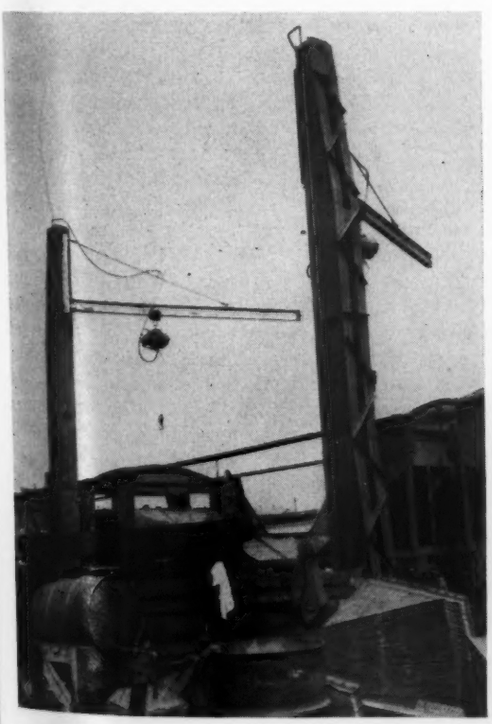
RAILWAY Mechanical and Electrical Engineer

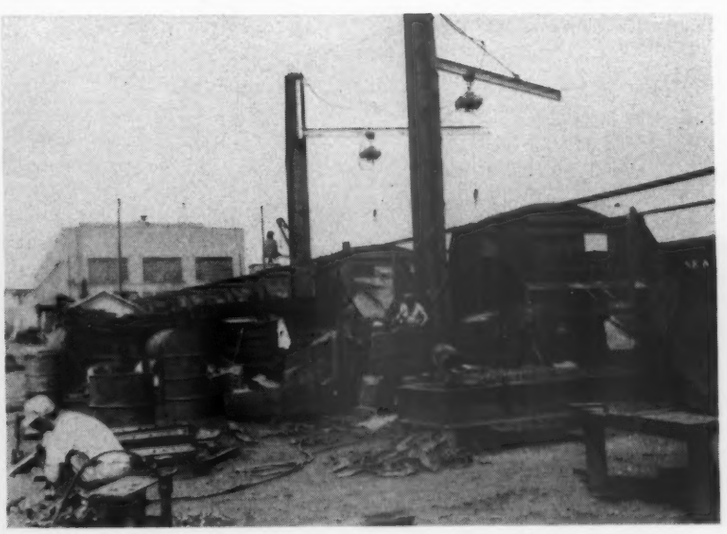


The degree to which the hopper cars were stripped preparatory to rebuilding.

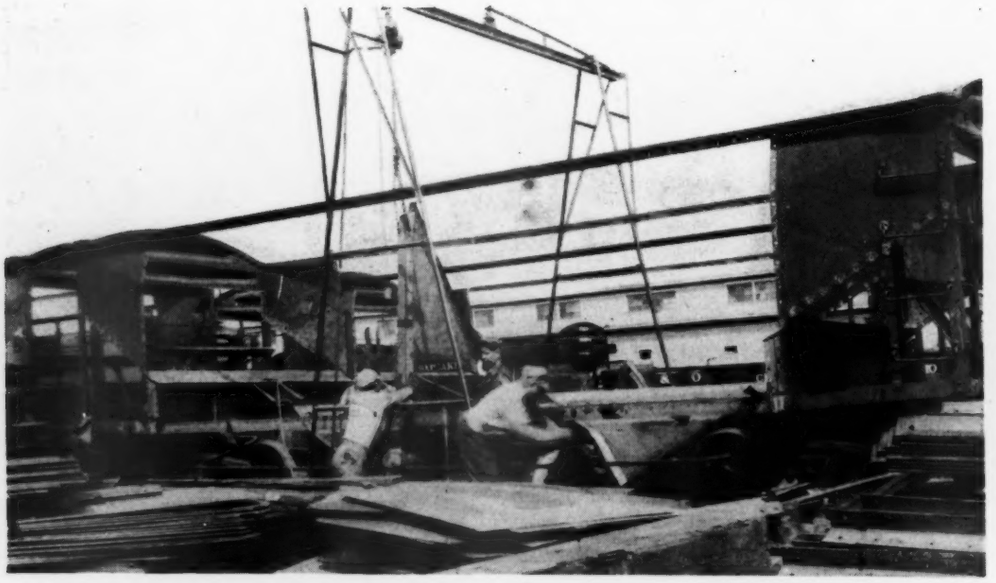
Unique Use Made of Shop in C. & O. Hopper Rebuilding

Outdoor production line so set up that shop at end eliminated most delays due to weather

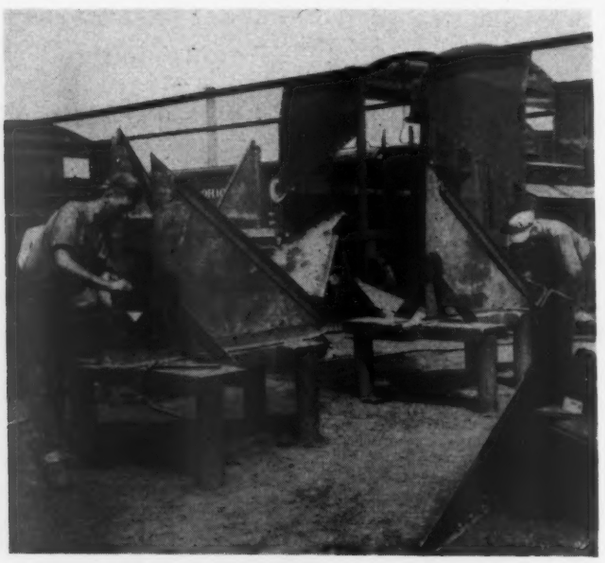




Two jib cranes, made from box-car center sills handle the application of center-ridge gussets and floor sheets. The car shop is shown in the background of the assembly at the right.



The large rubber-tired A-frame shown hanging a new center ridge gusset top section performs an important function in rainy weather. A canopy is hung by the traveling hoist over the bulb angles to protect the second position, which is the key position at which work must be completed in order to permit subsequent operations to be carried on.



Fitting up the new gussets preparatory to riveting on the jig.

THE Chesapeake & Ohio has rebuilt 1,385 50-ton hopper cars at the Wyoming shops of the Pere Marquette District in Grand Rapids, Mich. The work was done in 7 stripping and 17 assembly positions on a single track about 800 ft. long, all outdoors except for the final 327 ft. which is enclosed in a car shop building.

Despite the fact that over half of the production line was out of doors, a full day's output could be attained in the event of rain. This was accomplished primarily by the layout of the production line, aided by an arrangement for shielding the key outside position with a canopy while rain is falling.

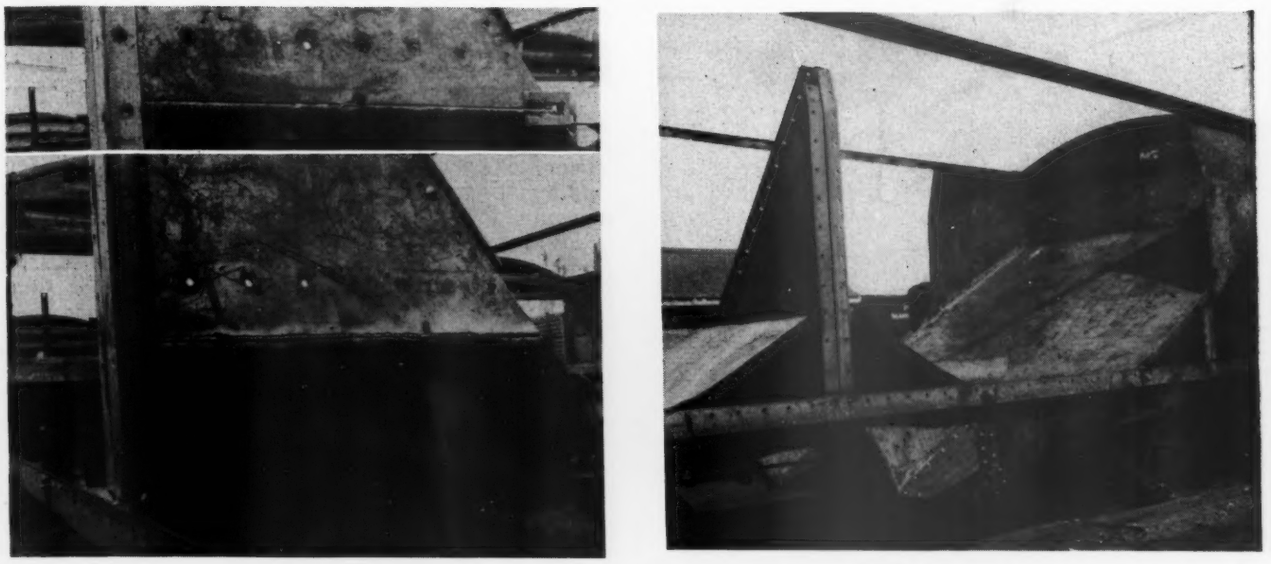
The production line was laid out with a nonworking, or hold, position between the end of the outdoor portion of the line and the beginning of the indoor portion. The seven stripping positions and nine of the assembly positions preceded the holding position; seven, beside painting, followed it, leaving seven cars to be worked on in the shop. The operations which would have been slowed up when it rained included the application, and the riveting or welding, of all major parts except side sheets, side posts, end sheets, splice plates and hopper doors.

The hold position, by providing an extra car or cars to put in the shop to augment the seven already in, avoided the decrease in the daily output of finished cars that would otherwise have occurred when the above operations were slowed down. Thus, if the daily output quota were seven cars, keeping one car at the hold position furnished an eighth car to go into the shop. If two were kept in the hold position, nine cars could be completed despite weather conditions.

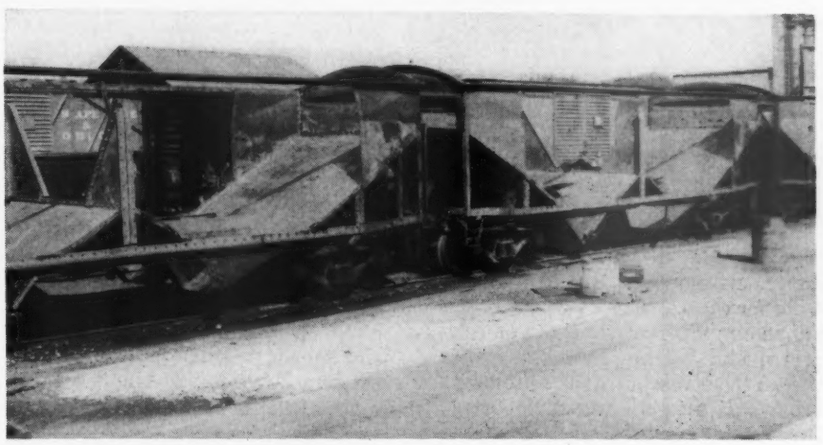
Production of the 1,385 cars was started April 2, 1951, and originally scheduled at the rate of seven cars per day minimum, getting eight on some days. It was increased to ten per day beginning September 17, 1951. With the final production schedule of ten cars per day, four cars were retained at the hold position. The extra cars served as insurance that seven, plus the four retained at hold position, could be completed whether or not full speed were maintained at preceding outside positions.

A second aid to maintaining full production irrespective of weather conditions was the use of a canopy placed on top of the bulb angles by a large pneumatic-tired A-frame. This protected the key position of the outside section of the line. The A-frame, wide enough to span the car crossways, was equipped with a traveling hoist which positioned the canopy on the bulb angles for protection of the welders. The frame, of light tubular construction and mounted on four large tires, could be moved back and forth easily by hand.

The key position protected by the canopy was No. 4, the first of two outside welding positions. Here, unlike position No. 9, the second welding position where welding that was not completed could be finished inside, the welding of the center ridge gusset top section had to be done before subsequent operations could be performed



The accuracy of the jig assembly of the new center-ridge gusset top section at the left is shown by how well it fits the lower section (above), making possible the excellent welded joint between the old and new section (below). At the right is a partially completed car at Position 6.



The final 160 ft. of the outdoor production line just before entering the shop is bordered by concrete runways. The cars above are in the hold position, which is also a material assembly position for subsequent operations in the shop building.

as this weld was covered up in a later operation in this position by the floor plates. While the canopy did not provide complete protection from the weather, it did reduce the amount of delay under moderately bad weather conditions and permitted some production to continue at Position 4 under all but the most extreme weather conditions.

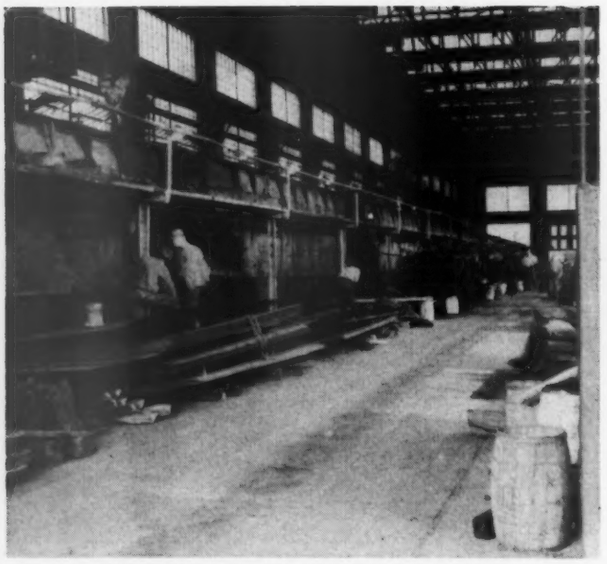
The outdoor section of the production line was 468 ft. in length, and the shop 327 ft., or a total length of 795 ft., excluding the painting facilities at the end of the shop line. A concrete runway 8 ft. wide runs along one side of the tracks at the hold positions for 160 ft.

The line in general was laid out to build up the stripped cars in three basic steps—apply some steel and rivet it; apply more steel and rivet it; and apply remaining steel and rivet it. Miscellaneous operations, such as fabrication of parts and air brake and truck repairs, were performed at convenient locations along the line.

The outdoor production track followed conventional lines with material stacked as close as possible to its point of application. It did, however, have one innovation—two cranes made from scrap center sills placed on one side of the track and used for handling floor sheets, cross-ridge sheets and end patches. The sills from 40-ton box cars were sunk in concrete pillars 8 ft. square by 4 ft. deep. An 8-in. I-beam, 20 ft. long, pinned near the top of each center sill served as the jib for the 1-ton hoist. Two men handled the cranes, one operating each hoist, for applying the parts, holding each part until another man pinned it in place. After pinning up, the crane men helped on the job.

Subassembly of the gussets and hopper doors, and straightening of bent parts were also done outside. Parts straightened included end sills, side sills, corner posts, etc. Most parts were straightened in place on the car. Those that were removed were straightened on a small outside press near the hold position, No. 9. The press was located here to be handy both to the shop and the outdoor production line. The concrete runway along that section of track permitted access by tractor.

The car-shop building is of brick construction with concrete flooring and scaffolding on both sides of the



The scaffolding in the shop runs most of the length of the hopper-car track.

track used for the hopper car work. Two traveling cranes of 15-ton capacity span the width of the building and run the length of the building. They are used to hang side sheets and to pick up the end of a car for truck changes. Movement of the cars within the shop is also done with the cranes. Jib cranes with 20-ft. radii and 2,000-lb. air hoists aid in truck overhaul operations. Any welding which could not be completed on the outside, except the gusset weld, was completed in the shop.

Stripping was done in seven positions on two tracks, six on No. 38 and one on 40. The car was stripped completely down to the underframe with the exception of the ends, bulb angles, corner sheets, corner posts and end posts. The work was done on moves of two cars at a time by 11 burners, 3 carmen and 2 laborers. The operations were divided between the seven positions as follows:

Position 1 (2 burners, 1 carman and 1 laborer). Dropped the four side sheets and cut the side sill angles. Removed the top and bottom floor sheets, the outside and the inside hopper sheets, the crossridge sheets, the crossridge gussets and the longitudinal hood sheets. Trimmed the steel ends. The carman and the laborer removed the scrap and piled it on the four side sheets which had been dropped for later removal by a bulldozer. The carman also removed all rivets from center sills, floor pans and floor braces. Four cars per day were stripped here.

Position 2 was identical with Position 1 as to the number and type of workers assigned and the operations performed. Here, too, four cars per day were stripped, making a total of eight of the ten cars scheduled daily.

Positions 3 and 4 (2 burners). These two positions can be considered as one position containing two cars with a scaffold running the length of the two cars on each side. The two burners assigned to these positions worked on the scaffold, burning the tops of the side sheets loose, the stub posts off, and the top halves of the side and center splice plates. The stub posts and the splice plates were saved for later reapplication. The preceding work was performed on eight cars per day.

Position 5 (2 burners). Burned the doors down and the door closing bars off the doors. Burned the bottom door hinge angles and the cardboard brackets, an average row of rivets from the side sheets, leaving two rivets in each side sheet to hold the side sheets on until removal at Positions 1 and 2. Cut the side posts off from the outside. Burned off the short splice plates at the bolsters and saved them. Burned the bottom half of the side and center splice plates. When the cars were finished, one burner helped the two burners at Positions 3 and 4 complete the eight tops. The remaining burner completed the stripping of the doors, burning the hinges off the hinge angles and removing the hinge pins. Eight cars per day were worked in this position.

Position 6 (1 burner and 2 laborers). Dropped the doors on two cars, burned the door closing bars off the doors, burned the bottom row of rivets from the side sheets, leaving two rivets in each side sheet. Cut the side posts off from the outside, burned off the short splice plates at the bolster and saved them. Burned the bottom half of the side and center splice plates; the burner did this on the last two cars, then helped on the doors. The two laborers picked up and loaded reclaimed material, stub posts, short splice plates, long splice plates, and the doors. This completed 8 cars per day.

Position 7 (2 burners and 1 carman). This was a two-car position on Track 40, the second of the two stripping tracks. The three men here stripped the two cars complete and handled all scrap and reclaimed material. These two cars, plus the eight stripped on the first six positions, furnished the ten stripped cars for the daily rebuilding assignment.

The cars were rebuilt on an assembly line basis in the following 17 positions:

Position 1 (1 carman). The car was cleaned up and generally prepared for the line, knocking off the rust, blowing off the car, painting the center sills, etc. This carman also helped assemble the side sill at Position 2.

Position 2 (1 burner, 1 carman and 1 apprentice). Trimmed off old center pusset sheets for application of new sheets. Applied and fitted up side sills. Removed bent corner posts, end posts, end sills and top end sheets when necessary.

Position 3 (1 carman and 1 apprentice). Applied and fitted up longitudinal hood sheets, inside hopper sheets and floor plate supports. An additional carman alternated between Positions 2, 3 and 4 to help fit up and handle some of the heavy material used in these positions such as side sills, gussets and floor plates.

Position 4 (1 welder, 4 carmen and 2 apprentices). Applied and fitted up bottom floor plates, floor stiffener angles, door closing angles and outside hopper sheets. Reamed all holes. Welded in new center ridge gusset and side sills, and tack welded the card board brackets. Applied hand brake and reamed longitudinal hood sheets. The large A-frame was used in this position to hang the gussets and the hand brakes.

Position 5 (2 riveting crews of 2 carmen and 1 helper each). Riveted bottom floor plates, longitudinal hood sheets, train line brackets, floor angles, transom ends and hand brakes, a total of approximately 220 rivets per car.

Position 6 (1 burner, 3 carmen and 1 apprentice). Applied and fitted up the top floor plates, center ridge sheets, side corner sheet patches, and end sheet patches. Two jib cranes hung steel in this position.

Position 7 (1 burner and 2 carmen). Fitted up and reamed top floor sheets, cross hood sheets, gussets, and door hinges. One additional car held in this position to keep line intact.

Position 8 (two 3-man riveting crews). Riveted top floor plates, center ridge sheets, bottom of the gusset, of 160 rivets per car.

Position 9 (2 welders). Welded in the longitudinal hood sheets and ends, the outside of top floor plates and side bearings. Also tacked the floor plates and cylinder brackets for riveting crews in position No. 8. Held

4 additional cars for shop in this position to maintain full production in event of rain. One laborer outside of shop picked up keys and pins for fitting up crews. This concluded all positions outside of steel car shop.

Position 10 (6 carmen and 1 burner). This was the first position inside the steel car shop. Here steel sides, posts and stub posts are hung and fitted up. The burner burned holes in the end patches and where holes didn't line up. Also applied safety appliances.

Position 11 (5 carmen, 3 apprentices and 2 air men). Reamed rivet holes in steel sides and ends of car. The air men cleaned the air brakes when needed, and did general air repairs, such as changing hoses and angle cocks and testing the car.

Position 12 (3 rivet crew and 1 burner). One rivet crew riveted the ends of cars in Positions 11 and 12, an average of 100 rivets per car. The other two crews riveted the gusset to the side sheet, the floor to the side sheet, and the short splice plates at the bolster of the car, and the hinge butt angles. These crews averaged 140 rivets per car. The burner burned the cotter keys, tie strap rivets and brake hanger pins for the truck-work position and cut out bad rivets in Positions 12 and 13.

Position 13 (4 rivet crews). Each crew riveted one-fourth of car's side sheet rivets, averaging 170 rivets per car per crew.

Position 14 (4 welders, 2 burners, 1 carman, 1 apprentice and 1 painter helper). One welder welded in coupler carrier irons on the facing ends of the cars in positions 13 and 14; a second welded on side corner patches and packing retainers in the truck sides; and two welded inside of the hoppers on the floors. One burner and the carman hung and fitted up doors. One burner and the appentice straightened the ends of the car, posts and grab irons that are bent. The painter helper removed rust and slag from the car.

Position 15 (9 carmen, 2 burners and 2 helpers). Five carmen worked on trucks, dismantling, repairing and assembling. Two burners worked couplers and draft gears with one carman who wedged the gear in the yoke and worked with the overhead crane to remove draft gears, yokes and couplers. He also helped on trucks. One carman and one helper worked on truck sides, removed dust guard plugs and dust guards, applied new ones and blowed out journal boxes. The helper also pulled and packed journal boxes. Two carmen and a helper operated as a rivet crew to rivet tie straps, floor rivets, center plates, truck side bearings and getting missed and bad rivets. They averaged 60 rivets per car. The ends of cars in Positions 15 and 16 are raised and placed on horses for working on the trucks.

Position 16 (3 welders). Laid up steel and welded holes around side posts, floor sheets and corners. Also welded coupler shims.

Position 17 (2 painters). Applied first coat of paint after washing with solvent. Sand blasting was not required as all material was either new or had been thoroughly cleaned at previous positions. Position 17 was outside of the shop building.

Following the cleaning and application of the first coat, the car was switched to the paint track for the second coat of paint and stencilling, which was done by five painters and four helpers. Two helpers also oiled and packed journal boxes on this track after painting was completed, using reclaimed waste. The packing at Position 15 was done with the old waste as a temporary measure until all painting was finished.

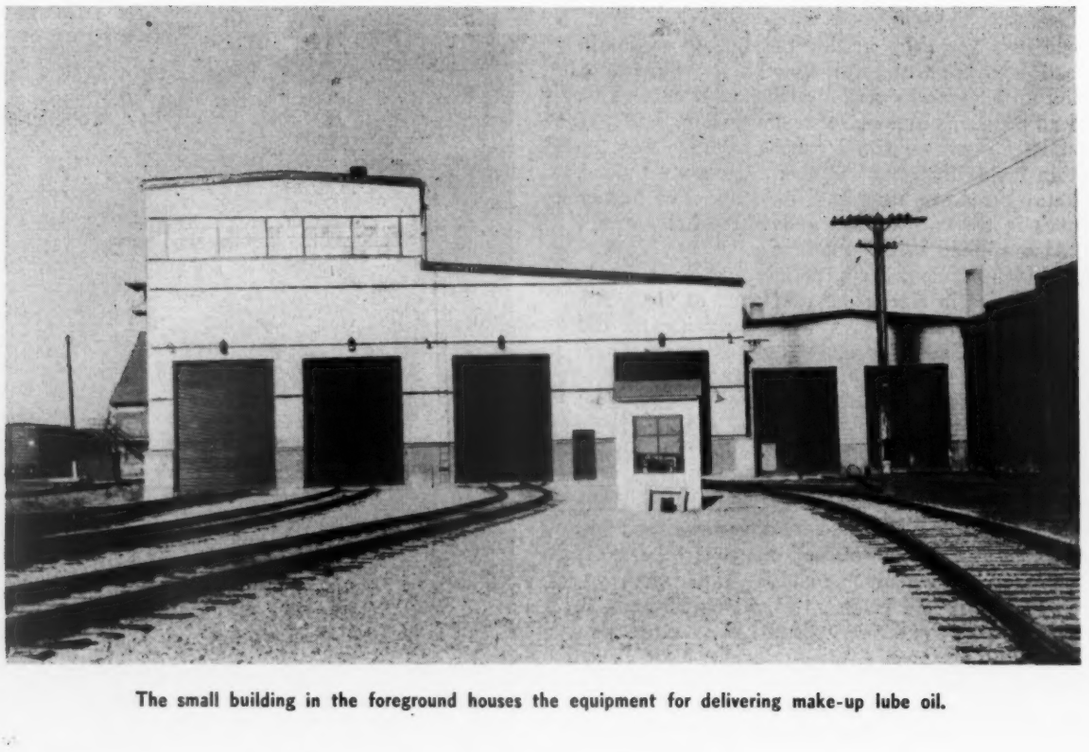
One inspector and one air man worked the shipping track where they made the final air test and adjusted the brakes, and gave the car a final overall inspection.

The area for changeout and repair of trucks and draft gears.

The draft gear is transported to the car and lifted into place with this two-wheel combination carrier and jack.

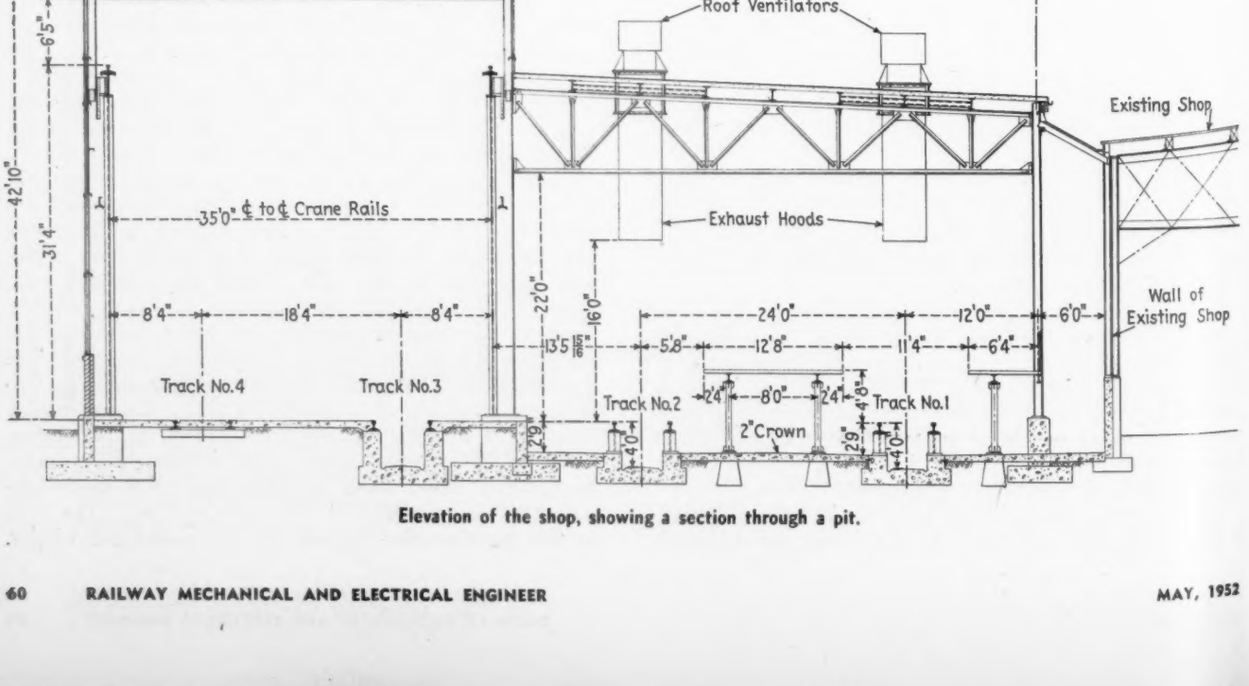
Eighteen men in addition to those employed on the line handled miscellaneous jobs and did subassembly work. There was one general inspector, and there was a helper who supplied oil for forges inside and outside of the shop. One burner and two apprentices tore down, repaired, assembled and tested hand brakes. The crane man operated the overhead crane, handling wheels, trucks and steel sides, and moved the shop line. A 50-ton jack was used between Positions 14 and 15 for straightening steel. An overhead I-beam equipped with a 750-lb. air hoist handled the air jack used in straightening ends.

Two jig crews were also employed. One comprised two carmen and a helper. They riveted hopper doors and worked on the press which straightened door angles and floor plate angles. The second jig crew was composed of one burner, four carmen and four helpers. Two of the helpers carried completed subassemblies from the jigs to the cars at Positions 2, 3 and 4. The remaining two helpers and the four carmen made up two rivet crews who used a gusset jig and a hopper pocket sheet jig to fit up, ream and rivet outside hopper sheets, center ridge gussets, door angle hinges, door locks, longitudinal hood sheet brackets, and floor plate supports, an average of 150 rivets per car set. The men at this position also cleaned up door locks and hinges.

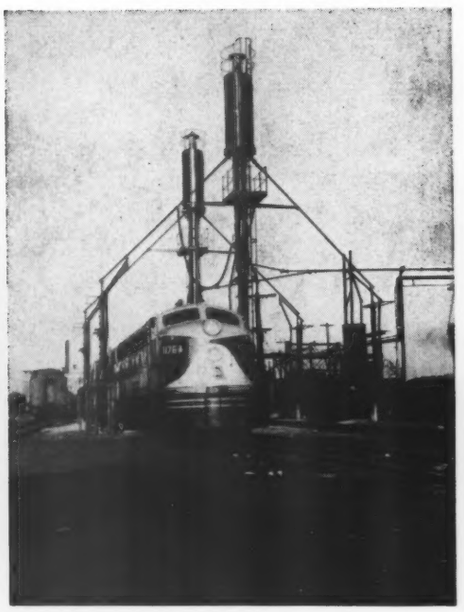


The small building in the foreground houses the equipment for delivering make-up lube oil.

Wabash Diesel Shop at Moberly



Elevation of the shop, showing a section through a pit.



The locomotive at the fueling station (left) is typical of the clean appearance of all Moberly-maintained units. The sanding facilities (right) serve the two entrance tracks and can sand three units simultaneously.

THE Wabash has built a new diesel shop at Moberly, Mo., which is modern and efficient in every respect. At the same time construction costs were held to a minimum by utilizing space and two of the walls of the existing L-shaped steam back shop at that location. The diesel servicing and repair area consists partially of an extension built on to one corner of the steam shop and partially of an area taken over from the steam shop. The latter, 45 ft. by 80 ft., houses a cleaning room, a parts reconditioning room, a storeroom, a tool room and an office.

The new section of the shop, that is the portion exclusive of the above-mentioned steam shop area converted to diesel work, has a floor area 198 ft. 10 in. by 86 ft. It has four tracks. One is for switching locomotives and heavy repairs, a second for truck work only. The remaining two tracks have locomotive floor level platforms for servicing road units.

The heavy repair track and the truck repair tracks are served by an overhead traveling crane with a 35-ft. span. a maximum capacity of 25 tons, and a 5-ton auxiliary hoist. The heavy repair track extends into the steam shop where wheel boring is done on an existing Bullard vertical turret lathe. A high level platform 21 ft. long and a little over 13 ft. above the floor is installed along the wall edge of this track at the approximate center of the inside length for access to locomotive roofs.

The truck repair track, like the heavy repair track, is a floor level track, and has a pit 28 ft. long and just under 4 ft. deep. Trucks are handled between this track and the center servicing track through a Whiting consolidated drop pit with a 23 ft. 10 in. inside clearance. An air hoist is also installed between these two tracks for use as a winch in moving trucks. Movements can be made in either direction at any point along the truck repair track by means of this winch and a fixed sheave at each end of the track.

Some truck work is at present being handled in the steam shop adjacent to the office and storeroom, but eventually will be handled within the diesel shop proper. This includes steam cleaning and rebuilding of trucks, and cleaning and servicing of traction motors. For turning trucks undergoing overhaul in this area, the Wabash built an extremely simple arrangement. A standard 25-ton air jack is placed in a pit approximately 3 ft. square, and a ball-bearing plate placed on top of the jack shaft. To turn the truck, it is run over the pit, and the jack is raised to contact the spring plank at a point where the truck will be in balance when lifted. Raising the jack a few more inches clears the truck wheels from the track, and allows the truck to be turned easily by hand.

The two servicing tracks have elevated platforms for access to the locomotive body interior, and these platforms are of cantilever design to minimize interference with truck and other underneath work. The rails are mounted on H-beam sections for better lighting within the pit and for easier handling of material between the pit and the outside. The inspection pit between the rails is 15 inches below the depressed floor on the outside of the rails. This feature permits a man to walk upright, or nearly upright, under the locomotive when it is over this pit. Lighting for underneath work is furnished by fixtures with two 40-watt lamps spaced at 8-ft. centers on the underneath side of the rail edge of each platform.

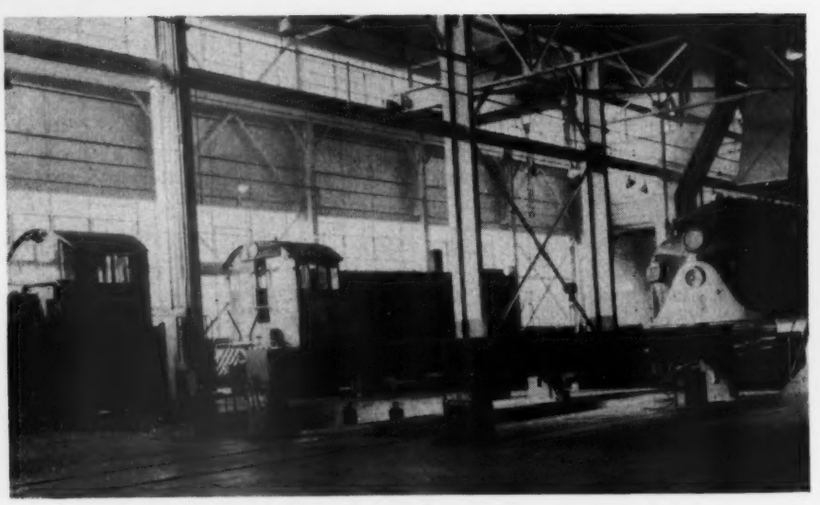
Each of the platforms is 108 ft. long, or long enough to accommodate two freight units or one passenger unit. This length is adequate as all freight locomotives maintained at Moberly comprise only two units, while all but one of the passenger runs are handled by single units.

Eight Exhaust Ducts

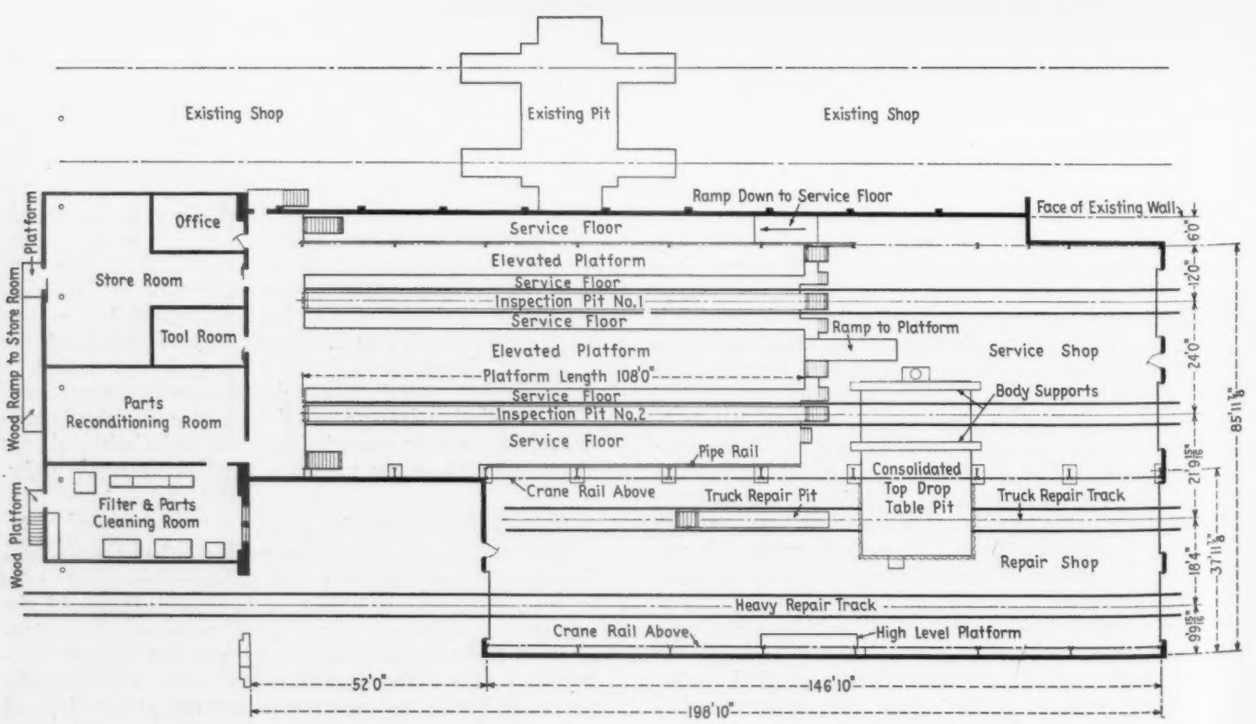
The heating and ventilating problems has been solved for this shop by installing eight exhaust ducts, four over each of the servicing tracks, to catch the exhaust of the engines regardless of where the locomotive is spotted. Each of the exhaust ducts has its own individually controlled fan and has shutters which close automatically when the fan is not running to prevent gravity loss of warm air. The arrangement has been found satisfactory

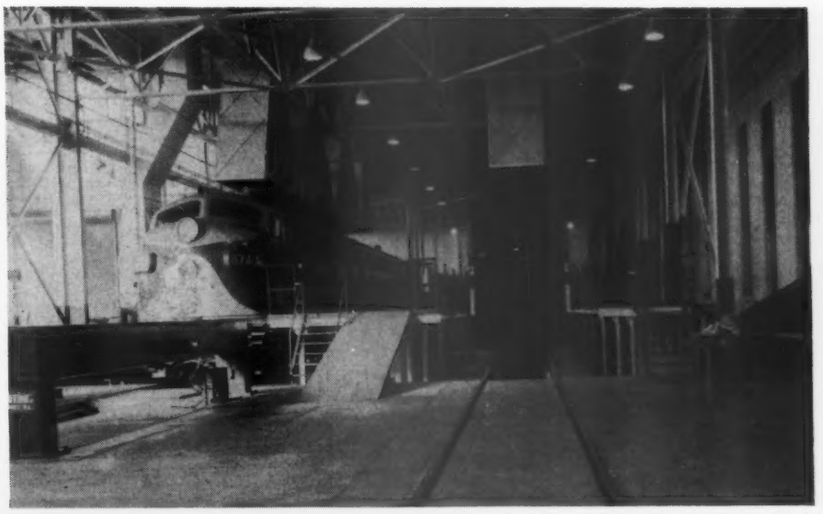
The eight individually controlled forced-exhaust ducts as seen from the center elevated platform.

The drop table which serves the two center tracks has an inside clearance of 23 ft. 10 in.

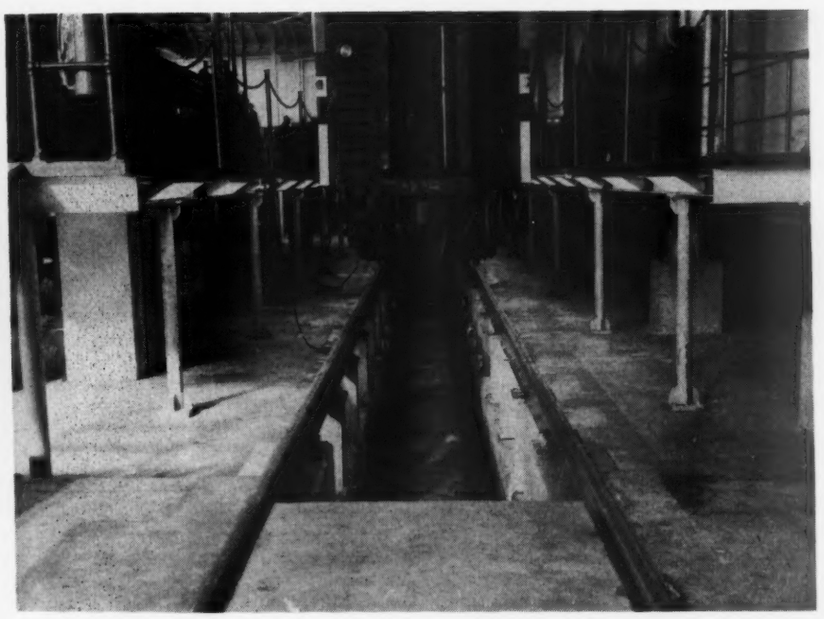


Layout of the new Wabash diesel shop at Moberly

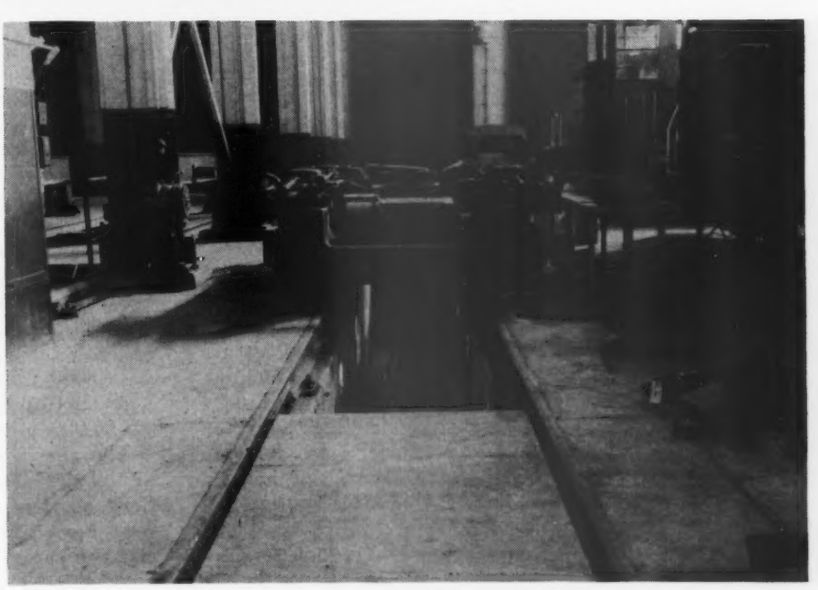




Interior of the servicing portion of the house.



The pit floor, 15 in. lower than the depressed floor outside the rails, gives a total pit depth of 4 ft. below the top of the rails and permits a man to walk upright, or nearly upright, under the locomotive.



The repair pit on the truck track.

in keeping the shop free from objectionable gases, and the heating requirements have not been considered severe. The ducts are mounted with the lower edges 16 ft. above the top of the rail, thereby fitting fairly close over the exhaust stack. This close fitting, plus the fact that only one duct need be in operation for each engine stack, accounts for the adequate dissipation of the exhaust fumes without expelling an excessive amount of warm air from the shop interior.

The tool room, parts reconditioning room, storeroom, and the filter and parts cleaning room as well as the office are located at the same level as the elevated platform. Such an arrangement eliminates having to carry parts or material up and down ramps, except to the truck and heavy repair track.

The cleaning room and the parts reconditioning room are each 20 ft. by 42½ ft. Both are served by a traveling crane with a ½-ton electric hoist and both are illuminated by overhead fluorescent lighting. The cleaning room is equipped with a Magnus Aja-Dip cleaning and rinsing arrangement, a Farr filter washer and oiler, and a shop-made oven. The two Aja-Dip machines, containing a volatile compound, have forced exhaust to the atmosphere. The room also contains a steel cabinet to hold parts for cleaning with a steam hose.

Flat filters are stored in a cabinet in one corner of the room, cylindrical filters in a drum in a second corner. The drum holds Michiana filters along the outside circumference and sintered bronze fuel filters in a rack mounted on the vertical support of the drum. The rack for the latter is simply a circular plate with holes bored out near the outside circumference to hold the bronze filters. Both the rack and the drum can be revolved easily to get at any of the filters in storage.

The parts reconditioning room contains a valve grinding machine, a honing stand, a head stand, a small dry grinder, cylinder head and liner testing equipment, speed recorder testing machine, face plate, gauges and indicators for checking pistons, connecting rods, piston carriers, etc., air and steam gauge testing equipment, steam generator stack switch and high temperature test equipment. The benches have slotted edges for working piston and rod assemblies.

The storeroom, office and tool room combined occupy an area 34½ ft. by 42½ ft. The storeroom covers this entire space except for two sections 12 ft. by 20 ft. in two of the corners. These two sections are devoted to the tool room and the office.

Working efficiency within the shop is kept high by issuing to each mechanic a tool box which he checks out of the tool room in the morning and checks in again at night before leaving. The tools vary slightly from one box to the other depending on the job to which the workman is assigned. In each box, however, is a group of tools which, based on experience, represents the best compromise between carrying around a lot of unnecessary tools and carrying so few that the mechanic is continuously running to and from the tool room. A list of tools in a typical box is shown in Table 1.

Outdoor facilities include a sanding tower, fueling station and a lubricating oil makeup station in that order proceeding into the shop. The sanding facilities and the fueling facilities both serve two tracks and can handle three units simultaneously. This is necessary even though none of the Moberly maintained locomotives operate in three units because three-unit freight locomotives in other maintenance pools do operate through and require servicing at Moberly.

The makeup oil station comprises a small steel structure equipped with a hose on a reel located between the two entrance tracks to the servicing portion of the shop. When the amount of makeup lubricating oil to be added has been determined, the oil is delivered under pressure to the locomotive through this hose. Control of the delivery is by a remote control switch in the add-oil house which turns a pump on and off in the lubricating oil storage room in the back shop. The desired brand is selected by setting the right valves in the make-up house, and the amount delivered is indicated by a meter.

As a safety feature to prevent damage to locomotives or to the shop building, "stop-and-go" type lights are mounted above the four entrance doors to the house. When a door is closed or only partially open the light above it is red. When the door has been opened sufficiently to clear the largest diesel unit used on the Wabash the light turns to green, indicating to the hostler that it is now safe to bring the locomotive through the door.

TABLE 1—LIST OF TOOLS IN INDIVIDUALLY ASSIGNED TOOL BOX

Screw driver
½-in. ratchet
5-in. extension for the ratchet wrench
10-in. extension for the ratchet wrench
8-in. crescent wrench
Prick punch
Injector timing gage
½-in. universal joint
Hammer
Chisel
Pliers
Injector pry bar
½-in. nut spinner
7-in. Extension for a ¾-in. drive wrench
Set of box wrenches from ½ in. to 1⅜ in.
Set of open end wrenches from 5/16 in. to 1¼ in.
Set of sockets with ½ in. drive from 7/16 in. to 1⅛ in.
Set of sockets with ¾ in. drive from ⅞ in. to 1 1/16 in.

Motive Power Maintained

The following units receive major maintenance work at Moberly:

Nine passenger units, including two GP-7 road switchers equipped with heating boilers and used in passenger service.

Twenty-two road freight units, including two GP-7's used in local service.

Twenty-three switching locomotives.

The Moberly shop also gives en route servicing to a minimum of 24 units each day in the form of eight three-unit locomotives which operate in through time freight service between Decatur, Ill., and Kansas City.

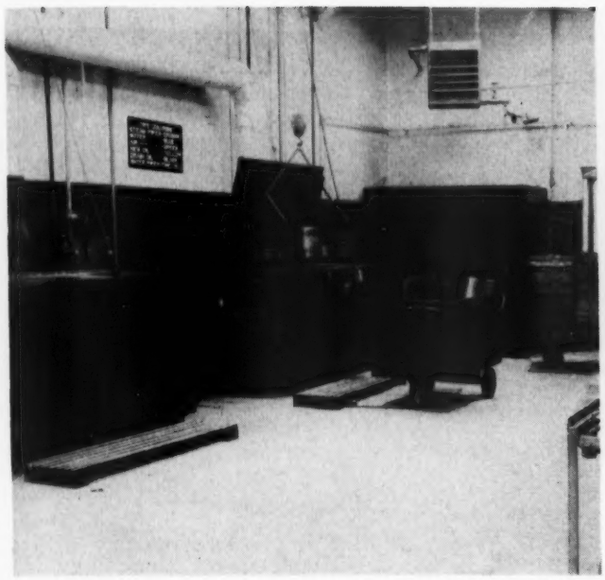
All freight and seven of the nine passenger units maintained at Moberly operate in general freight and passenger pools with no locomotive assigned to any specific train. The remaining two passenger units comprise the regularly assigned locomotive for the streamliner "City of St. Louis."

The units maintained at Moberly are given all periodic inspection and all heavy work that becomes necessary between scheduled repairs. Scheduled heavy repairs to all Wabash power are made at the Decatur diesel back shop at the following intervals:

170,000 miles for switching locomotives.
400,000 miles for freight units.
750,000 miles for passenger locomotives.

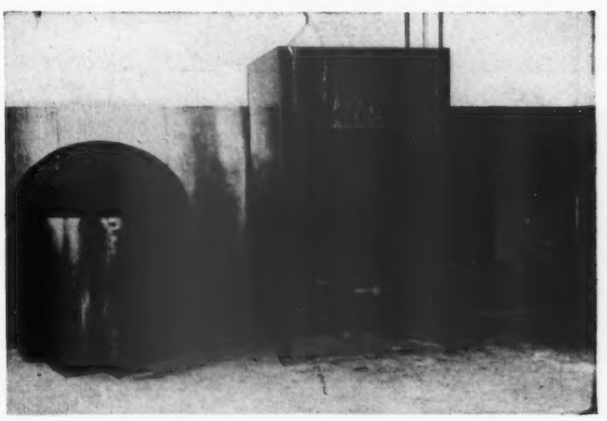
The above mileage schedules are flexible. If a unit in any of the three types of service is at or near its mileage limit but has the engine in good shape, the wheels at proper contour, the traction motors recently gone over, etc., the period would likely be extended.

Of the 23 switching units assigned to Moberly for maintenance, only three are stationed there. The remain-



The cleaning room. The filter cleaner is in the right foreground and the cleaning tanks at the left.

The interior of the filter storage drum



The steam cleaning and rinsing booth on the right and the storage drum for Michiana filters and sintered bronze filters on the left.

ing 20 work at various scattered points in the district. Those switchers stationed outside of Moberly receive all periodic inspection at the points where they are stationed. If heavy work becomes necessary between the general repairs made at Decatur, the switcher is brought to Moberly for the particular job to be done and is at that time also given such other repairs as are considered necessary to keep it on the job at its working point for an extended period of time.

For example, if a switcher that is stationed at Omaha requires a new set of wheels, the unit is brought to Moberly for the new wheel set and while there the engine is gone over, the traction motors touched up, the auxiliaries checked, etc.

While Moberly does not handle scheduled heavy repairs, it does do extensive work when such work becomes necessary between the scheduled back shoppings. In one recent case, a Kansas City switcher received all new liners, pistons, rings, exhaust manifold and turbo-charger, and the heads were reconditioned.

In general engine work is done complete as is body and truck work. Electrical work is handled up to dipping and painting. Some commutators are turned on small motors up to the approximate size of auxiliary generators. Traction motor and main generator commutators are stoned only.

Wheel work is done complete. Individual wheels are bored in a section of the steam shop adjacent to the extension of the diesel shop heavy repair track. Mounted wheel sets are turned in the car shop. The latter are handled in the car shop because a new and modern machine has been installed there. To make economical the handling of the wheels to and from the car shop a concrete ramp has been laid down between the locomotive and the car shop. The wheel sets are carried back and forth between the two buildings on a fork lift truck. The truck is also equipped with a horn for handling unmounted wheels.

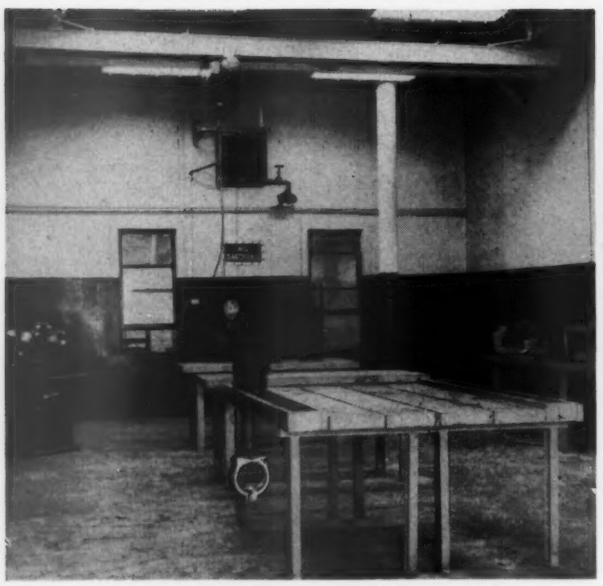
Lubricating oil changes are made principally on the basis of chemical analysis, usually on the fire and flash and the dilution tests. The railroad also sets a limit at which the oil must be changed regardless of condition; this limit is 30,000 miles for freight units, 50,000 for passenger, and 6 months for switching locomotives.

When an oil change is made the fact is recorded on a card which shows the date of the change and the brand of oil in the engine, and this card is displayed in the cab of the locomotive. The use of such cards has eliminated lengthy searches in the locomotive log book to determine the brand of oil that is already in the engine when makeup oil is needed.

Cleaning Emphasized

One of the strongest impressions a visitor to Moberly receives is the unusually clean appearance of all units maintained at this point. A thorough cleaning job is done on all passenger units and all freight units at each 5,000-mile inspection and whenever the unit is brought in for periodic inspection. Switching locomotives are cleaned thoroughly each month.

All cleaning is done by hand with a handle brush, using Oakite No. 70 and water for the body and Oakite No. 8 and distillate for the trucks and underneath parts. On the car body the procedure is to spray the solution over the entire surface with air pressure, followed by a man with a long handled brush to agitate the solution on the surface. He is in turn followed by a third man who gives the body the clear water rinse.



The parts repair room before it was completely equipped.

Passenger locomotive wheels are thoroughly cleaned and whitewashed every 5,000 miles to facilitate inspection for cracks. At the lower right is the equipment for spraying on the whitewash.

The flat blade on the bottom of this scraper is used for scraping most of a wheel; the curved blade, for the radius between the rim and the plate. The use of the scraper avoids moving the locomotive for scraping or to pinch the wheel around.

Trucks are cleaned by spraying from a tank under pressure over the entire truck surface, as well as the tops of traction motors, tops of fuel tanks, air reservoirs, brake cylinders and other underneath parts. The sprayed on solution is allowed to set for 10 minutes, after which it is washed off with hot water hose containing hot water under high pressure. During the cleaning and rinsing operations on the trucks, the engine and the traction motor blowers are left running to keep water out of the traction motors.

The interior is sprayed with a fine mist of Oakite No. 8 plus distillate to cover the entire interior, including the engine, passageways, floors and roof. This is washed down with clear hot water. The excess water on the floor is then blown toward drain holes with an air hose. After the excess water has been flushed out through the drainage hole, the floor is mopped dry.

One of the secrets of good truck washing is considered by the Wabash to be the use of extremely hot water and the 150-lb. pressure used in the rinse. With the high velocity that results from this high pressure the dirt and grease loosened up by the cleaning solution is completely knocked off.

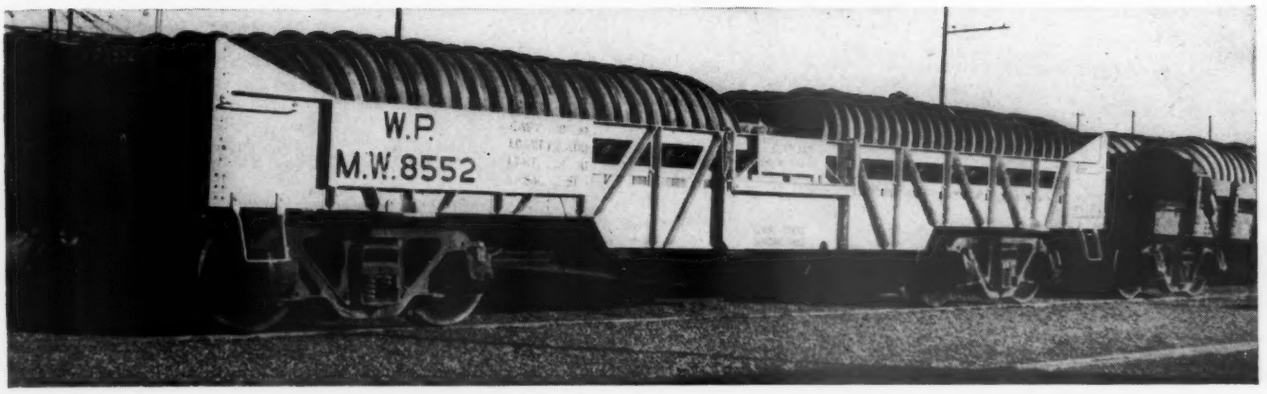
Trucks are washed outside regardless of weather. The car body is washed outside in nice weather and inside in bad weather. The inside washing is done in a stall in the adjoining steam roundhouse. This stall had been lengthened to 140 ft. for the large-tender steam locomotive the Wabash operates, and is therefore adequate to handle 2-unit freight or passenger diesel locomotives.

Close Attention to Wheel Inspection

The Wabash follows a strict policy of keeping passenger, freight and switching locomotive wheels scrupulously clean to facilitate inspection for wheel cracks. On passenger units this policy is carried one step further with all wheels whitewashed every 5,000 miles.

Each wheel is first thoroughly cleaned and scraped with a special scraper. This scraper has a flat blade on one end for cleaning most of the wheel. The other end has a curved blade to scrape the radius between the plate and the rim. The scraper is so shaped and is long enough that any part of the wheel can be scraped in place without moving the locomotive or pinching the wheel around. After scraping to remove the worst dirt and grease, an evaporating solution is sprayed on to prepare the wheel for the whitewash. After the cleaning solution has evaporated the whitewash is sprayed on and allowed to dry, at which time the cracks are readily detectable.

Both the cleaning solution and the whitewash are sprayed on the wheel through a syphon arrangement with a long nozzle, using the house air supply to pick up the fluid. The use of the long section of tubing for the spray nozzle avoids, as does the long scraper, having to move the locomotive or pinch the wheel around to get at the entire wheel surface.



Western Pacific Wheel Cars

Left—How the wheels are braced at the center. The gate may be opened at either side. Right—The permanent blocking at the car end is wood.

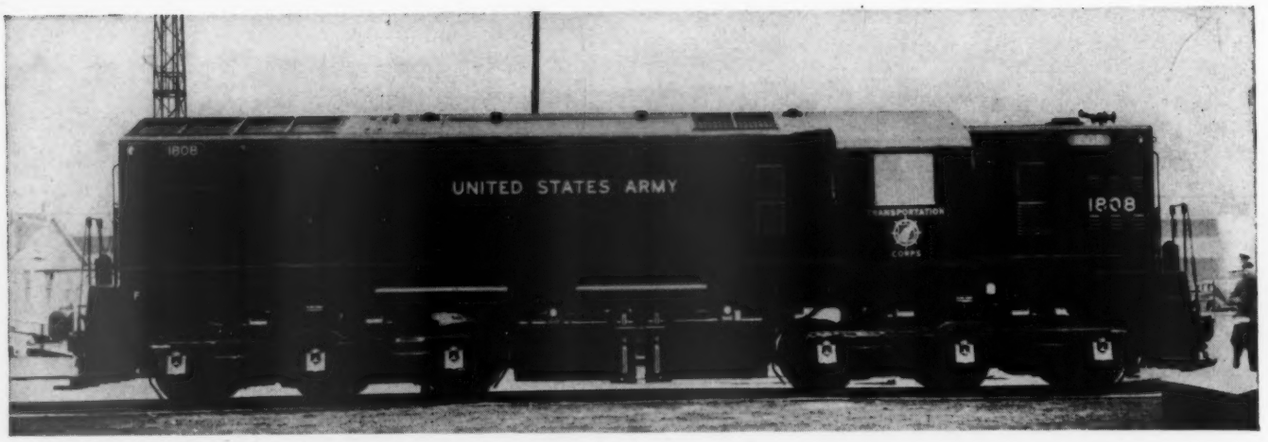
THE Western Pacific has fitted up at the company shops, Sacramento, Calif., four cars designed especially for handling unmounted car wheels between the Sacramento shops and the Griffin Wheel Company's plant at Salt Lake City, Utah. These cars were reconstructed from a series of 36-ft. steel-underframe stock cars recently retired. All of the material, except the steel ends, which were reclaimed from scrap box cars, was obtained from parts of the stock cars. The underframes and draft rigging were strengthened and side sills reinforced with 9-in. channels at the center of the car.

Fifty-ton cast-steel side-frame trucks from retired gondola cars were used, thereby making them suitable for carrying 50-ton loads. A normal full load for these cars, as now being used, is 156 wheels.

The wheels are loaded in three rows from each end toward the center where they are kept in place by spreaders made of scrap angles with an inclined circular plate and plug at each end to fit in the wheel bores. These are adjustable for length by the insertion of pins in positioning holes.

Western Pacific experience in handling loose car wheels by this method has been satisfactory, loads being delivered in good condition without any displacement of wheels at the car center, or rows of wheels being tipped over as frequently happened with former types of loading.

An accompanying view of the unloaded car shows how inclined permanent wood blocking is installed at each end to keep wheels standing at a certain slope and to absorb end shocks. Once the car is loaded, the adjustable metal struts or spreaders are put in place, using the convenient metal hand holds shown, and expanded as much as possible to hold the wheels in place during road movement. The side gate arrangement includes removable hinge pins located at each end so that the gate may be swung in either direction or removed entirely by lifting both hinge pins. These pins have keepers fastened to the top side plate and also have cotter keys at the lower end.



The MRS-1, versatile 1,600-hp. diesel-electric road-switcher, built to Army specifications by the Electro-Motive Division of General Motors Corporation.

E. M. D. Develops Diesel Locomotive for Army

All-purpose unit has standard domestic locomotive wearing parts. Controls and electrical equipment simplified

A NEW type of diesel locomotive known as the Military Road Switcher I, capable of being operated on nearly any track except narrow gage, has been developed upon specifications of the United States Army Transportation Corps by the Electro-Motive Division of General Motors at its La Grange, Ill., plant. The first of thirteen of the MRS-1 was delivered to the Army about the middle of April. The locomotive was designed, developed and manufactured at the La Grange plant and is being service tested on middle western railroads.

The locomotive is so designed that it can be successfully operated in temperatures ranging from 40 deg. F. below to 125 deg. F. above zero. By simple mechanical adjustments its wheels can be moved on the axles so that the locomotive can be operated on tracks ranging from the standard American width on up to the widest encountered on railroads anywhere. Its draft gear is such that it can be quickly fitted with couplers running the gamut of the types used and can be placed in pockets at two heights—34½ in. and 41 in. above the rail. The locomotive can be regularly operated on fuel oil of as low a grade as 40 cetane and in emergencies can be operated on an even lower grade. It is designed for multiple operation with other locomotives of similar characteristics, irrespective of builder, which the Army Transportation Corps now has or has on order.

In announcing the delivery of the first locomotive, Nelson C. Dezendorf, vice-president of General Motors and general manager of Electro-Motive Division, said that "despite its wide range of performance characteristics, the locomotive is made up of standard domestic diesel locomotive wearing parts and assemblies. Thus we were able to shorten the development of the locomotive by years and to make it possible to go into production without plant conversion if we get into a major emergency. So many of the locomotive's major components are standard that Electro-Motive could start producing it without any major delays for changing facilities. At the end of the emergency we could go back to the production of locomotives for domestic use with small delay and no expensive conversion. If we send a lot of these locomotives overseas, there will be no problem on replacements of wearing parts."

The new locomotive is 57½ ft. long, 13 ft. 6 in. high from rail and 9 ft. 8 in. wide over grab rails. Its engine

PRINCIPAL DIMENSIONS AND WEIGHTS OF THE MRS-1 DIESEL LOCOMOTIVE

Overall length between coupler pulling faces, ft.-in.	57-5
Width over grab irons, ft.-in.	9-8
Maximum height above rail, ft.-in	13-6
Distance between bolster centers, ft.-in.	31-0
Truck rigid wheel base, ft.-in.	13-2
Boiler water capacity, gal.	800
Fuel oil capacity, gal.	800*
Sand capacity, cu.ft.	18
Lubricating oil capacity, gal.	200
Engine cooling water, gal.	210
Total loaded weight on rails, with boiler,, lb.	246,000
Axle load, lb.	41,000
Maximum speed, m.p.h.	77
Gear ratio	60:17
Wheel diameter, in.	40

* If boiler is eliminated, fuel capacity is doubled.

is rated at 1,600 hp. for propulsion purposes. Its top speed is 77 m.p.h. Intended for any class of operation—switcher, passenger, or freight—it has been designed to achieve the same results as would be obtained from standard U.S. freight or road switcher units, within the track load limits of European practice.

The locomotive has fully flexible, equalized trucks, with special provisions for high-speed operation. The trucks have three axles, each axle powered with an Electro-Motive D-27 traction motor. All conversion equipment for adapting the locomotive to various track gages has been built into the trucks. The conversion is executed by a rearrangement of parts.

Controls have been simplified to enable enginemen with any previous experience with steam, electric, or diesel motive power, to operate the locomotive without danger of damage to foreign light-weight rolling stock in spite of the unusually high tractive force the locomotive will develop. Main-line contactors have been eliminated and other electrical equipment has been simplified in the interest of minimum maintenance.

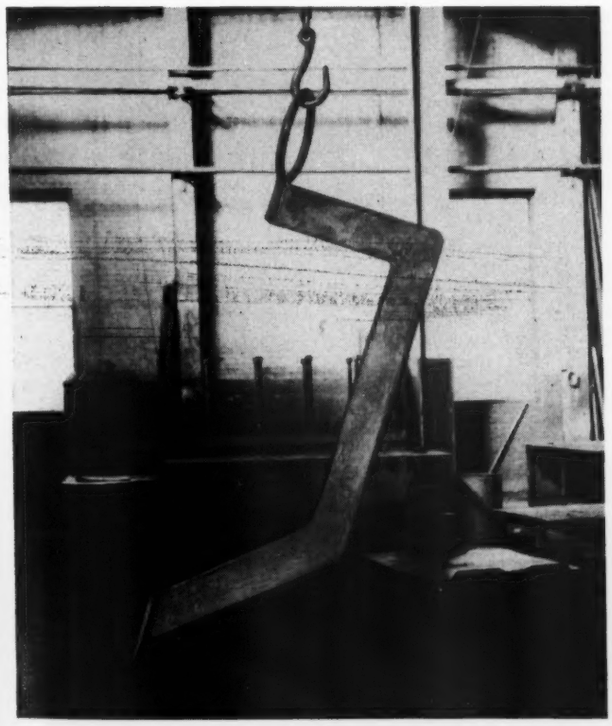
Total weight of the MRS-1 is about the same as standard locomotives of the same horsepower rating, but the distribution of weight over six axles instead of four improves adhesion. Dependable adhesion on good dry rail at full horsepower is 23 per cent, while starting tractive force on good dry rail is 30 per cent.

The MRS-1 is equipped with 6BL air brakes, with provision for vacuum brakes, and the brakes are single rather than clasp type. Journal boxes are friction (solid bearing) type.

The locomotive is powered with a General Motors 16-567B diesel engine, with horsepower input to generator rated at 1,600. The D-12 generator is the same as that used on all General Motors freight locomotives, with a D-14 alternator.

The electrical circuit has two motors in series, with three groups in parallel. There are no shunt steps—the operator having a choice of either full shunt or no shunt. Transition is made at approximately 30 m.p.h.

The principal dimensions and weights of the locomotive are set forth in the table.



Lifter for raising G.M. switcher heads clear of the studs

Hook Simplifies Switcher Head Lifting

The illustration shows a fabricated hook to lift the engine heads of General Motors switchers clear of the studs. The hook, made of 1 in. by 4 in. stock, is shaped to fit around the hood to permit lifting the heads straight up. While suspended from the hook of the overhead crane, the head lifter is light enough to be easily worked around the hood as it is lowered into position for lifting the head.

Prevents Breaking Sintered Bronze Filters

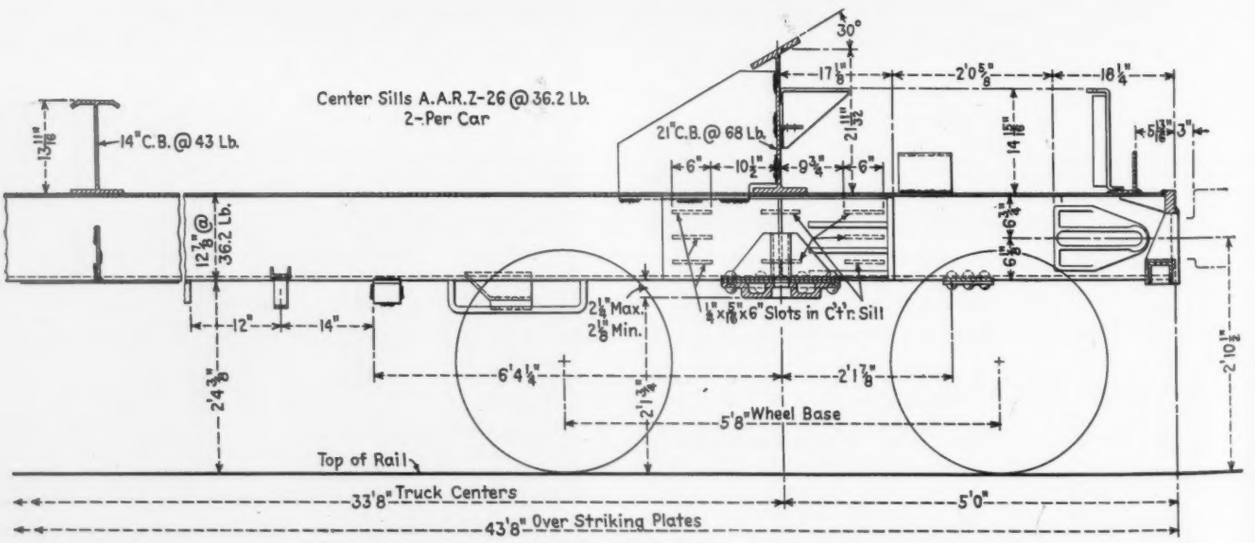
The Peoria & Pekin Union has devised a simple and effective method for preventing breakage of Electro-Motive sintered bronze fuel oil filters or crimping of the gaskets. It consists only of an old quart container for oil or anti-freeze cut and shaped to guide the filter into place.

The can is slipped into place over the bronze filter with the gasket in place, and the entire assembly is pushed into the filter housing with the can left in position between the filter and the housing. The gasket is thus held by the four projections of the cut can in its proper position on the flange of the filter and cannot become twisted or pinched. The can also protects the filter from damage during handling, and it is stiff enough to hold the entire assembly in place for applying the spring and cap at leisure. When the filter has been assembled in the housing, the cut can is left in place as it offers negligible resistance to fuel flow.

Cutting an old quart tin can as shown above protects E.M.D. filters and gaskets from damage during assembly

One of the 50-ton cars just out of the shop

One of 300 new 70-ton welded hopper cars built by Pressed Steel Car Company



Partial cross-section of underframe of C. & E. I. hopper cars by Pressed Steel

C. & E. I. Gets New 50 and 70-Ton Hopper Cars

Cars have exceptional strength, and increased life in coal service is expected because of corrosion-resistant design features

THE Chicago & Eastern Illinois has received from the Pressed Steel Car Company 1,000 hopper cars of 70 and 50-ton capacities, which cost $5,570,500 and are intended for handling increased coal business, including that from Indiana and Southern Illinois mines to defense plants in adjacent territory. It is anticipated that the use of thicker sheets in contact with the load will in the long run reduce repair costs, as well as out-of-service time, and extend car life five to eight years.

The addition of this equipment will bring the total ownership of hopper cars on the C. & E. I. to 576 70-ton cars and 2,010 50-ton cars.

Two Types of Trucks Used

The 70-ton cars with three hoppers utilize Barber Type S-2-A Stabilized trucks with 6-in. by 11-in. journals. The 50-ton cars with two hoppers have A.S.F. Ride-Control trucks with 5½-in. by 10-in. journals. Both cars have outside stakes for better unloading, and the attendant loss of capacity due to slightly less inside width is made up by a small increase in car length. The cars are fabricated by welding and have just a few parts applied by riveting, such as center plates, draft-gear carrier irons, roping staples, door hinges and fixtures, and safety appliances. Comparative general dimensions and weights are given in the table.

Plate thickness has been increased to give longer car life at some penalty in heavier weight, as illustrated by the 70-ton cars. The car sides have been increased from $\frac{3}{16}$ in. to ¼ in. in thickness; floor sheets, hopper sheets, longitudinal hoods, doors, cross ridges and cross ridge knee braces from ¼ in. to $\frac{5}{16}$ in. In other words, all parts of the car interior subject to wear and corrosion from the coal loading, are made $\frac{1}{16}$ in. thicker than customary when copper-bearing steel is used as a structural material.

The result is an increase in car weight from 44,600 lb. for an earlier car of this type to an average of 48,400 lb. for the present design, or 3,800 lb. Studies have shown that hopper car floor sheets made of copper-bearing steel lose on the average about .008 in. of thickness per year due to corrosion and this may be increased to .012 in. per year for the lower parts of hopper sheets subject to maximum corrosion and erosion.* The anticipated increase in car life by adding $\frac{1}{16}$ in. to the thickness of copper steel floor sheets is, therefore, five to eight years, against which must be charged the extra cost of heavier steel in the plates plus the expense of hauling this added dead weight around.

The center sills are A.A.R. Z-sections weighing 36.2 lb. per ft. welded together at the top. End sills are 6-in. by 3½-in. rolled angles. Side sills are 5-in. by 3½-in. rolled angles from end sill to bolster and 3½-in. by 3-in. angles between bolsters with suitable reinforcement at the hoppers. The bolsters are 21-in., 68-lb. I-beams with top flanges formed to suit the floor and securely welded to the center sill. Bolster gussets larger than usual are applied one on either side of the center sill, being welded to the bolster web, upper part of the center sill web and to the floor plate, thus greatly stiffening and strengthening the construction at this point.

On the 70-ton cars, fabricated steel bolster center fillers are slot-welded in place in accordance with approved current practice. All bolster ends are attached to the side sheets by welded angles which distribute the load by means of two rows of welding about 8 in. apart instead of a single buttweld at the bolster web.

* Reported in a paper by H. Malcolm Priest, manager, Railroad Research Bureau, United States Steel Corporation, published in *Railway Mechanical and Electrical Engineer*, June 1951, page 43.

Hopper car rotated in Pandjiris positioner at Mt. Vernon shops for down-hand welding

Two cross beams per car consist of 14-in., 43-lb. I-beams with the top flanges formed to suit the cross ridge floor sheet and securely welded to the center sill. Front draft lugs are drop forged and welded to the center sill, striking plates being of welded construction. Rear draft lugs, welded integral with the bolster center filler, are welded to the center sills.

Diagonal braces are ¼-in. pressed steel except at the cylinder corner of the car where 5/16-in. steel is used End posts are 3-in., 6.7-lb. Z-shapes. End sheets, 3/16-in. thick, are welded at the top to 5-in. by 3½-in. rolled bulb angles.

The ¼-in. car sides are stiffened with inside knee braces at the cross ridges, made of 5/16-in. pressed steel, side stakes on the outside being ¼ in. Side stakes were at one time made without flanges but in this design short flanges are provided to assure good contact and welding to the side sheets. Corner posts are 3½-in. rolled angles and longitudinal hoods 5/16-in. steel, as mentioned.

The 5/16-in. hopper sheets are welded to the center and side sills and have 3-in., 4.1-lb. channels applied underneath the chute. The 5/16-in. crossridge sheets are formed in one piece.

The upper floor is stiffened with a 4-in., 5.4-lb. channel welded to 3½-in. angle floor supports. An additional floor stiffener, applied at the center sill, consists of a 3-in. by 2½-in. angle.

All steel plates, sheets and strips are open-hearth steel with a .20 per cent minimum copper content, all other steel conforming to A.A.R. Specification M-116-49.

In building the C. & E. I. hopper cars at Mt. Vernon shops, every effort has been made to utilize a maximum amount of automatic and semiautomatic submerged-arc welding. In general the cars are assembled in 20 positions including two initial off-track underframe spots and nine positions each in the east and west bays with a transfer table connecting them at one end. The center sills are fabricated in the usual manner in another shop building where center fillers and longitudinal hood sheets are also applied. Car sides, side stakes and bulb angles are assembled in a separate progressive line and go through an automatic welding machine where pneumatic clamps hold the steel sheets firmly together and two welding heads are available, for example, to make welds on both sides of each side stake simultaneously. An unusual feature is exclusion from this assembly of the side sills which are built in with the underframe assembly.

In the first off-track spot, the center sill, as received from an adjoining shop, is placed in an underframe jig, and cross ridges, bolsters, floor sheets, also slope sheets, hopper sheets and side sills applied by tack welding. The asembly is moved by shop crane to the first track spot and mounted in an underframe positioner which permits readily revolving it to any angle required for most efficient welding.

Placed upside down on its own trucks, the underframe then moves through several positions where all underneath parts and equipment are applied. The underframe is righted and progresses to Shop Position 9 on a transfer table where the car sides are applied and tack welded preliminary to complete down-hand welding in one of two welding positioners, a special feature of this shop. These positioners were built by the Pandjiris Weldment Company, St. Louis, Mo. They are used to engage the car end, lift the car for truck removal and revolve it to any angle, through 360 deg., in three minutes. The

GENERAL DIMENSIONS AND WEIGHTS OF WELDED C. & E.I. HOPPER CARS BUILT BY PRESSED STEEL

	50-Ton	70-Ton
Number of hoppers	2	3
Length inside of body, ft.-in.	35 - 0	42 - 8
Width inside of body, ft.-in.	9 - 10	9 - 10
Width over side top angles, ft.-in.	10 - 7¼	10 - 7¼
Length over end sills, ft.-in.	35 - ⅜	42 - 8⅜
Length over striking plates, ft.-in.	36 - 0	43 - 8
Distance between truck centers, ft.-in.	26 - 0	33 - 8
Center plate height above rail, ft.-in.	2 - 1¾	2 - 1¾
Height, rail to center of coupler, ft.-in.	2 - 10½	2 - 10½
Height, rail to top of side, ft.-in.	10 - 8	10 - 8
Drop-door length in clear at bottom, ft.-in.	2 - 10	2 - 10
Drop-door length in clear at top, ft.-in.	3 - 9	3 - 9
Width of drop doors in clear, ft.-in.	2 - 3	2 - 3
Capacity, level full, cu. ft.	2,172	2,785
Journal, size, in.	5½ x 10	6 x 11
Light car weight, lb.	40,200	48,400
Truck weight per car set, lb.	14,000	16,400

positioner columns are rigidly secured to a heavy foundation in the shop floor, but may be adjusted without great difficulty to varying car lengths or moved to another part of the shop if not needed for a particular type of car.

The point of engagement with the car body consists of a massive lifting bar with central rectangular steel plug projecting into the coupler pocket. The lifting bar also supports the end sill at each corner of the car. In operation, the car with couplers removed is rolled between the two positioner columns, lifting bars advanced into the coupler pockets by pneumatic cylinders and safety cables applied at the corners. The car is then ready to be lifted and revolved at will, this method of attachment being designed to support the car body at or near its center of gravity. The revolving mechanism and electric drive can therefore be kept within reasonable size limits. Power for lifting and revolving the car body is supplied to both lifting heads and all electric controls are carefully synchronized and interlocked for safety.

From the positioners the hopper cars proceed along the production line for conventional finishing operations. They are switched into the shot-blast house where a special device is used to lift the cars while the trucks are moved out of the building preparatory to shot blasting. All mill scale and dirt are eliminated down to the clean, base metal before final painting and stenciling.

With the production line timed to move at 20-min. intervals, Mt. Vernon shops turned out an average of 18 of the 70-ton cars a day and this production is increased to 25 a day with the smaller 50-ton cars.

Valve spring depressor as applied. It is secured in place with the long leg of the U-shaped pipe over one of the rocker arm studs and the hook attached to this leg under the flange

Hand-Operated Valve-Spring Depressor

Shop forces of the Chicago Great Western at Oelwein, Iowa, have built a hand-operated valve-spring depressor that depresses, simultaneously, the four valve springs on Electro-Motive heads for application of the half collets and locks the springs in the depressed position until released after the half collets have been put in place.

The long leg of the U-shaped pipe portion of the depressor slips over one of the rocker arm studs, and a hook affixed to this leg slips under the flange of the head to lock the depressor in place. As applied, the handle of the depressor is vertical. Lowering it depresses the four springs through a plate, and a cam action at the joint between the two members of the lowering linkage system locks the handle in place with the springs depressed.

When handle of the depressor is lowered, the four springs are depressed simultaneously and locked in depressed position for application of the half collets until handle is released

Piston clearance leads are miked in two or three seconds with this dial indicator arrangement

Two Diesel Engine Gages

Two gages have been developed at the Citico shops of the Southern in Chattanooga, Tenn. The first gage reduces the time required for miking piston clearance leads to two or three seconds per lead. It consists of a dial indicator mounted on a 9-in. circular plate ¾ in. thick and a fixed vertical rod. The leads are merely slipped between the fixed rod and the arm of the dial indicator, and an immediate reading is obtained.

Gage for checking P-pipe assembly

The second gage checks the P-pipe assembly, and is also mounted on a circular plate 9 in. by ¾ in. made of ordinary steel with a machined finish. The top of the gage is for the manifold end, and the bottom for the liner fit. The top has a hole for the manifold fit of the tube, and the bottom has a hole for the liner connections. To be acceptable, the P-pipe must fit both of these holes and the dowel holes.

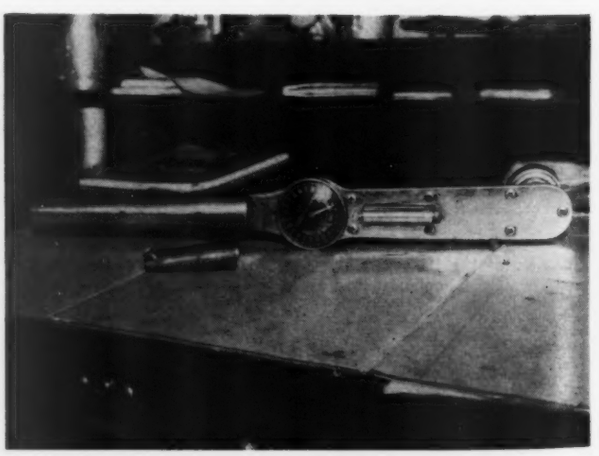
Keeps Torque Wrench Dial Housing Where Set

The Peoria & Pekin Union has devised a simple addition to a Snap-On torque wrench which prevents accidentally changing the setting on the dial housing, and thereby causing the indicating light to flash at the wrong foot-pound setting.

The addition is the short section of 1-in. piping shown in the illustration. This section includes about a third of the circumference on the large (right) end and about a quarter of the circumference on the small end, which is at the left in the illustration. The shoulder between the two ends is equal in size and shape on both sides.

The small end slips into a recess in the handle of the wrench far enough to line up a hole in the small end of the pipe section with the hole nearest the dial on the wrench. The hole in the pipe section is tapped to receive the thumb screw shown in place in the picture; the hole in the wrench handle is bored out large enough for threaded end of the thumb screw to slide in and out.

With the pipe section in place in the wrench handle, inserting and tightening the thumb screw draws the small end up. This forces the large end down with the shoulder between the two different-sized sections acting as the pivot point. As the large end is forced down it clamps the dial housing firmly and prevents unintentionally changing the ft-lb. torque setting through bumping or brushing against an object.



This small section of pipe clamps the dial housing in place at the torque setting desired and prevents accidental change in the setting

QUESTIONS AND ANSWERS

Diesel-Electric Locomotives*

Lubrication Oil Pump

433-Q.—What type lubricating oil pump is used? A.—It is of the positive displacement type employing a pair of helical spur gears as rotors.

434-Q.—How is it mounted and driven? A. — It is mounted on the free end casing and gear driven from the engine crankshaft through a spline arrangement.

435-Q.—Will there be any difficulty experienced when mounting a pump to the engine? A. — No precautionary measures are required, as a boss on the back of the pump assembly assures positive alignment.

436-Q.—What must be applied to the spline end of the pump before mounting? A. — Make certain that the thrust washer is applied to the spline end of the pump before mounting.

437-Q.—How are the gear and bearings lubricated? A.—The gear and bearings are lubricated from the free end gear spray. Additional lubrication for the bearings is supplied through the drive gear flanged bushing.

Pressure Regulating Valve

438-Q.—What is the function of the pressure regulating valve? A.—To control the oil pressure in the system.

439-Q.—What type valve is it? A. — An adjustable spring loaded regulating valve.

440-Q.—Where is it located? A. — On the discharge side of the lubricating oil pump.

441-Q.—How is the adjustment made? A. — The spring pressure is regulated by means of an adjusting screw which is held in place by a lock pin and protected by a lock nut or cap. To adjust the pressure, remove the cap and locking pin, turn adjusting screw clockwise to raise the pressure and counter clockwise to decrease the pressure.

442-Q.—What should the pressure be at full engine speed? A.—45 to 55 lbs. as shown on the gauge on the engine control panel.

443-Q.—What should the setting be when any work is done on the regulating valve? A.—The bench setting should be 80 to 85 pounds when any work is done on the valve.

444-Q.—Why is this done? A.—To allow for a line loss through the system, as the gauge pressure is taken at the end of the main header or the end of the system.

445-Q.—Is this adjustment final? A.—No. Final pressure adjustment should be made of 45 to 55 p.s.i. on the locomotive with the engine at full speed.

Lubricating Oil Filter

446-Q.—Where is the lubricating oil filter located? A.—Behind the air compressor on the left side of the locomotive.

447-Q.—What does the oil filter contain? A.—Eight filter elements, each equipped with a $\frac{5}{16}$" orifice to maintain approximately a 20 p.s.i. pressure drop across the filter and to insure a definite quantity of oil for the engine.

448-Q.—What does each filter element contain? A. — Each filter element contains a sock type filter cartridge or it may be packed with 7½ pounds of long strand cotton waste after installation of center tube.

449-Q.—What is each filter provided with? A. — Two drain valves and a vent line.

450-Q.—What is the purpose of the vent line? A.—To eliminate any formation of air pockets in the filter housing.

451-Q.—What is the purpose of the two drain valves? A.—When changing filters open the upper drain valve. When draining the entire system both drain valves should be opened.

452-Q.—What must be done to remove filter tank cover? A.—1—Open upper filter drain valve. 2—Turn filter tank lock ring counter clockwise and remove. 3—Remove cover and gasket.

453-Q.—What procedure is followed to remove cartridge and strainer? A.—1—Remove wing nuts. 2—Remove guide plate. 3—Remove cartridge and strainer from tank.

454-Q.—When about ta recharge cartridges, clean strainer and tank, what should be done first? A. — Turn cartridge cover and remove.

455-Q.—What should be done on cotton waste type cartridges? A.—Remove old waste and replace with 7½ lbs. of clean filtering material. Pack cartridges so that there are no voids in the waste.

456-Q.—What should be done on the sock type cartridges? A.—The insert should be removed from the core tube and scrapped. Clean cartridge cage and apply a new sock.

457-Q.—What else should be done? A. — Clean oil strainer element by dipping in a cleaning solution and blow out with clean compressed air. Wipe out tank with a clean rag. *Do Not Use Waste.*

458-Q.—What method should be followed when replacing cartridges and strainer in tank? A. — 1—Place cartridge in tank so that they engage flanges in partition plate. (Hair pin bends will guide cartridge into place over the flange.) 2—Place metal strainer in tank so that it engages the center flange in the partition plate.

459-Q.—When the elements are positioned correctly in the filter casing, what should be done? A. — Close the drain valves and completely fill with clean engine lubricating oil.

460-Q.—How much oil is required? A. — About 30 gallons.

* This series of questions and answers relate specifically to the Alco-G.E. Diesel electric locomotives.

461-Q.—What operation should follow? A. — Place guide plate over cartridges and strainer allowing tie rods to extend through the proper holes in the guide plate.—Place strainer and cartridge center top bosses in the proper holes in guide plate.—Replace wing nuts on tie bolts and tighten until guide plate bears on all cartridges.

462-Q.—Before replacing filter tank cover what much be done? A.—Clean gasket groove to prevent possibility of leakage.

463-Q.—What should then be done? A. — Inspect cover gasket—renew if necessary. Press gasket firmly into bottom of groove.

464-Q.—After placing the gasket, what should be done? A.—Clean cover tongue and place cover on tank, making certain that the tongue is properly placed in gasket groove. Replace lock ring which should be turned securely in place. It is not necessary to "force" this ring.

465-Q.—What attention should be given the filter elements in order to keep the lubricating oil clean? A.—Filter elements should be re-packed periodically.

466-Q.—What would warrent immediate oil and filter change? A.—Any formation of sludge on these elements.

Lubricating Oil Cooler

467-Q.—What is the lubricating oil cooler? A.—A heat exchanger of the vertical shell and tube type.

468-Q.—How many coolers are provided? A.—One for each engine.

469-Q.—Where is the lubricating oil cooler located? A.—Behind the air compressor on the right side of the locomotive.

470-Q.—In what way does the cooler function? A.—To keep the lubricant at a predetermined temperature for efficient lubrication of engine parts.

Schedule 24 RL
Air Brakes

Suggested Procedure When Pipes Are Broken. Automatic Brake Valve.

1312-Q.—Is a locomotive brake available?

A.—Yes. If the independent brake valve is not mounted on the automatic brake valve pedestal, the independent brake valve can be used if the main reservoir loss of air is cut off.

1313-Q.—What should be done if stop reservoir pipe 8 is broken?

A.—Close pipe on the brake valve side by short tight bend to be able to obtain a train overspeed or safety control release. The service application portion cut-out cock can be closed and proceed without any repairs.

1314-Q.—What must be done if second reduction reservoir pipe 18 is broken?

A.—Proceed without any repairs.

1315-Q.—How is the operation affected?

A.—Safety, overspeed and train control brake pipe reductions are unlimited.

1316-Q.—What action should be taken if the suppression reservoir pipe 19 is broken?

A.—Repair leak on brake valve side by tight close bend on the pipe.

1317-Q.—How is the operation affected?

A.—Proceed with loss of permanent suppression feature.

1318-Q.—Suppose that suppression pipe 26 or 17 is broken?

A.—Repair leaks on brake valve side by close tight bend. Proceed with loss of partial suppression.

1319-Q.—What can be done in the event that gage pipes are broken?

A.—Repair leak with close tight bend and proceed without the use of gages.

Independent Brake Valve and Rotair Valve

1320-Q.—What must be done if main reservoir pipe 30 is broken?

A.—If broken at any point repairs must be made to have the use of independent brake valve.

1321-Q.—Suppose that the break occurs in the branch to the independent brake valve?

A.—Stop the loss of main reservoir air and the controlled emergency feature is still available.

1322-Q.—Is the automatic brake affected?

A.—No.

1323-Q.—What action should be taken if the actuating pipe 13 is broken?

A.—Proceed without any repairs.

1324-Q.—What feature is thus lost?

A.—The independent quick release feature is lost.

1325-Q.—What precaution must be taken?

A.—The brake valve handle must not be placed in lock-down position.

1326-Q.—What action should be taken if the application and release pipe 20 is broken?

A.—Proceed with the independent brake valve handle in release position (not locked down).

1327-Q.—What feature is lost?

A.—The independent locomotive brake.

1328-Q.—What should be done if controlled emergency pipe 35 is broken?

A.—Place rotair valve in *PASS* position.

1329-Q.—What features are thus lost?

A.—The controlled emergency feature and other freight functions of split reductions, etc.

Brake Cylinder Relay Valve

1330-Q.—What must be done if main reservoir pipe 6 is broken?

A.—It must be repaired to have a locomotive brake.

1331-Q.—In the event that repairs cannot be made, what should be done?

A.—Stop loss of main reservoir air and follow instructions of the railroad involved?

1332-Q.—What action should be taken if brake cylinder pipe 30 is broken?

A.—Same as for main reservoir pipe *6*, unless break in cylinder pipe is beyond the cylinder cut-out cock in which case close the cut-out cock and proceed with these brake cylinders cut out.

1333-Q.—What should be done if control pipe 16 is broken?

A.—It must be repaired to have a locomotive brake. Otherwise, follow the instructions of the railroad involved.

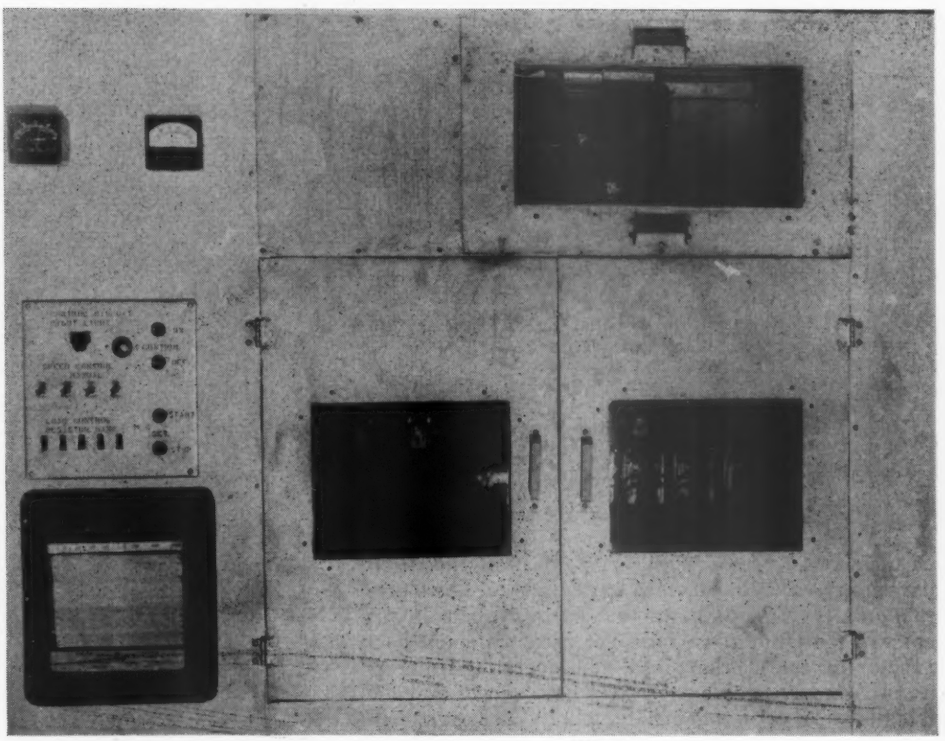


Fig. 1—Front view of the voltage regulator test stand showing the control panel. The recording voltmeter and tachometer are shown at the lower left. The regulator being tested is behind the glass panel at the upper right

Test Rack Improves Locomotive Operation

Effective means for testing, developed by the Atlantic Coast Line, make it possible to restore auxiliary generator voltage regulators to their original condition

THE ATLANTIC Coast Line Railroad Company has recently placed in service at their Waycross, Georgia, Shops, what is believed to be the first fully automatic diesel auxiliary generator voltage regulator test equipment that has been built by any of the railroads in the country. This test rack was designed and constructed by Mr. H. F. Woodside, assistant electrical foreman.

The maintenance of correct auxiliary generator voltage is of vital importance to the proper operation of the diesel locomotive. Failure of the voltage regulator to hold this voltage within proper limits can produce several annoying and costly maintenance experiences. Low voltage will permit the battery to become discharged,—decreasing battery reserve protection of the control bus, and eventually resulting in a cranking failure, which may mean train delays. High voltage may cause a blown generator fuse, which if not detected and corrected in time, inevitably causes a road failure. High voltage subjects the battery to an excessive amount of charge, causing abnormal water consumption and violent cell gassing. These in turn mean heavy grounds, increased maintenance to clear grounds and water the battery, with short battery life paying the final price.

Diesel electricians for several years have realized

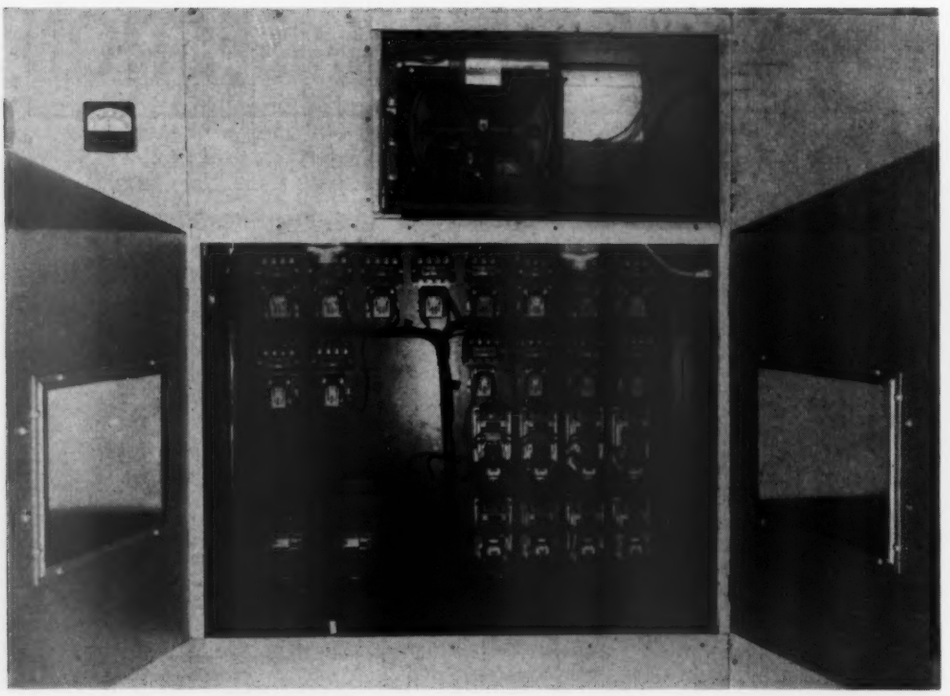
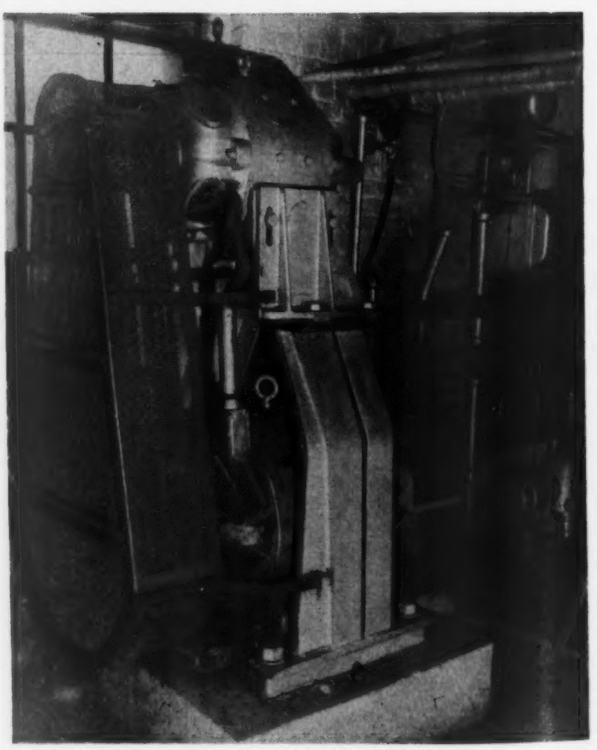


Fig. 2 (Left)—The voltage regulator test stand with cabinet doors open showing the control relays and the voltage regulator in position

Fig. 3 (Below)—The d.c. motor and auxiliary generator drive for the voltage regulator test stand

from their battery record cards that something has been amiss with the adjustments they have made to the voltage regulators. They have known that settings made in the shops which were correct, have not been maintained on the road after full load and maximum operating temperatures occurred. Checks on the road have shown that the regulators were not holding the auxiliary generator voltage constant at both idling and running speeds, and that voltages increased several volts above shop settings after maximum operating temperatures occurred. A number of regulators were found so erratic, that with engines running steadily at idle speed and auxiliary generator loads constant, the voltage would suddenly jump four or five volts.

These observations definitely indicated that a facility was needed that would accurately check the behavior of the voltage regulator under all road operating conditions. As a result, Mr. Woodside designed a test rack which is capable of, both automatically and manually, subjecting the regulator to all of the variable load temperature and generator speed changes which can occur in normal service.



Equipment Required

The regulator test rack consists of the following:

1. A motor generator set, using an E.M.D. 10-kw. auxiliary generator, vee belt connected to a variable speed d.c. motor. The motor control features permit operation of the generator through the full range of speeds occurring in a diesel locomotive. Speeds may be controlled automatically, or manually, through approximately five equally spaced steps between idle and full engine speed.

2. Auxiliary generator loading is accomplished by means of a variable resistor. When in automatic operation, the load is adjusted to full generator rating when the generator is turning at minimum speed. As the speed automatically increases, the load is simultaneously reduced in approximately five equal steps to about 20 per cent of generator rating by the time full generator speed is reached. The low-speed cycle is then automatically reversed and the load increases as the speed decreases. It takes about twelve minutes for the equipment to complete a cycle of operation from maximum load, minimum speed, through minimum load, maximum speed, back to maximum load, minimum speed. This automatic cycle of operation will continue indefinitely without attention. Under manual operation, any selection of speed or load condition can be made and maintained

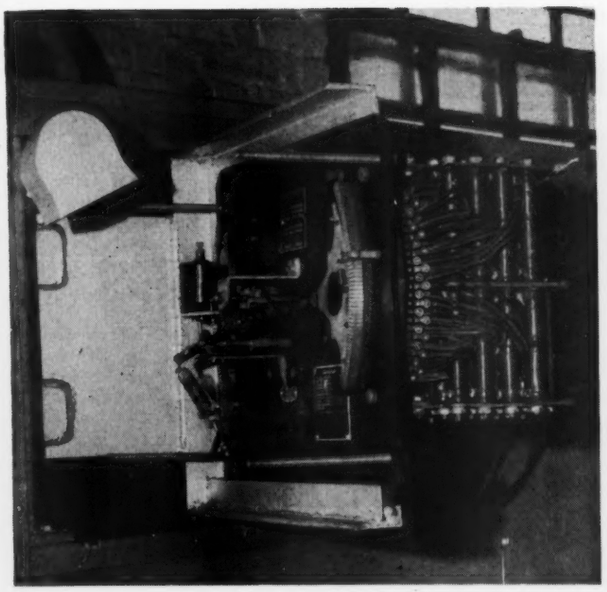


Fig. 4—Swing-out mounting for the voltage regulator to be tested

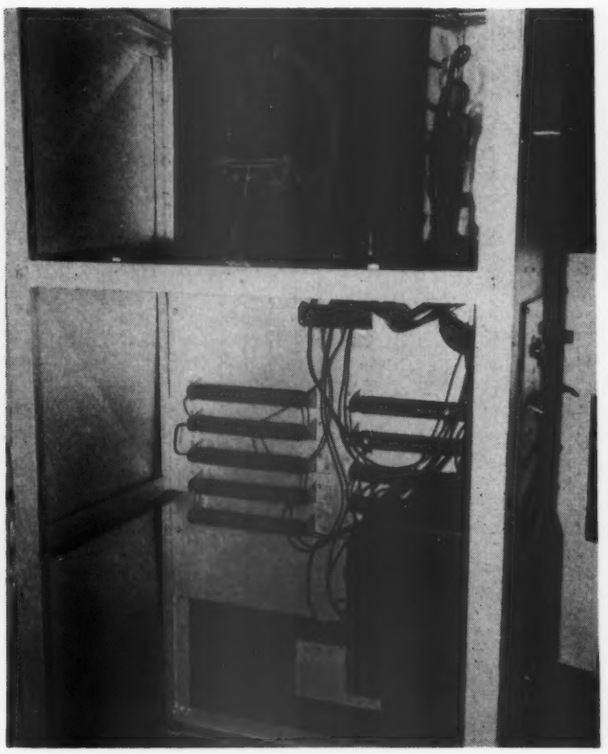


Fig. 5—The blower fan is shown above and the d.c. motor-drive field circuit resistors below

indefinitely. Incorporated with the resistor bank is a cooling fan, which transfers heat from the resistor bank into the compartment of the test rack where the voltage regulator on test is mounted for the purpose of producing temperature conditions under which the regulator would normally operate in road service.

3. A 32-cell diesel battery, reverse current relay, and battery charging contactor panel completes the auxiliary generator equipment.
4. The test rack control panel includes the following:
   a. One selector switch for manual automatic control.
   b. Four single-pole toggle switches for manual speed control.
   c. Five single-pole toggle switches for manual load control.

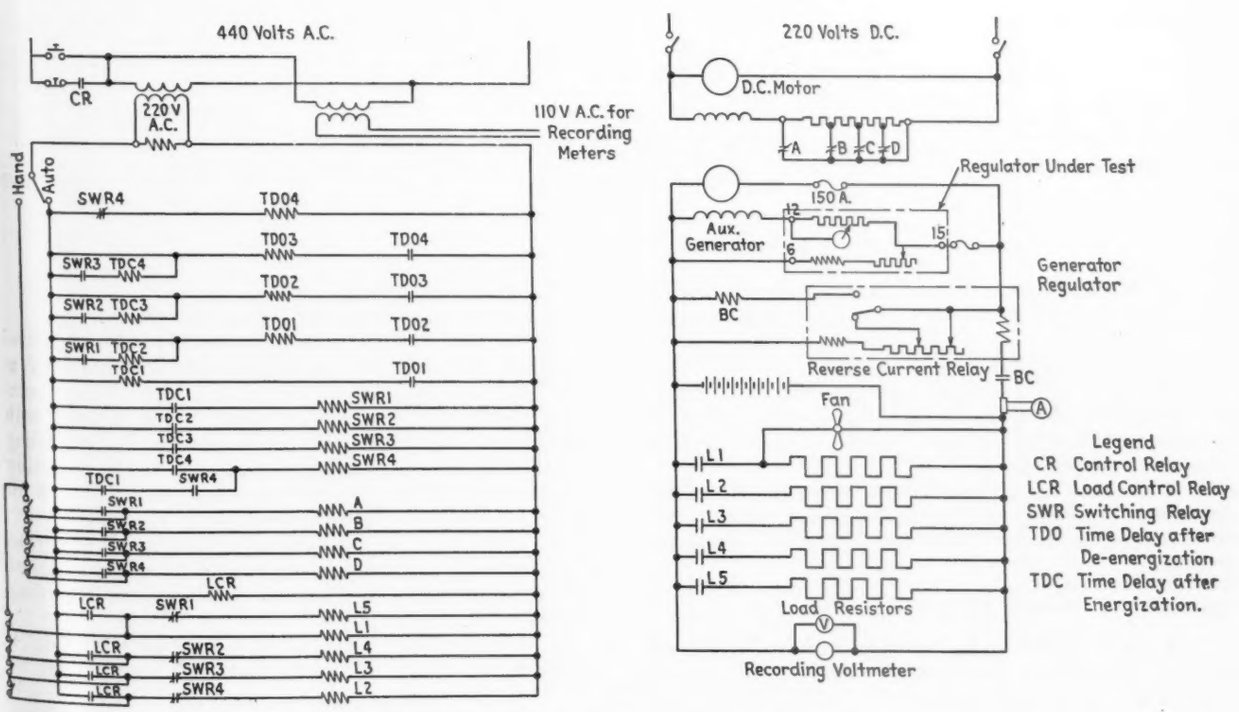


Fig. 6—Wiring diagram for the voltage regulator test stand

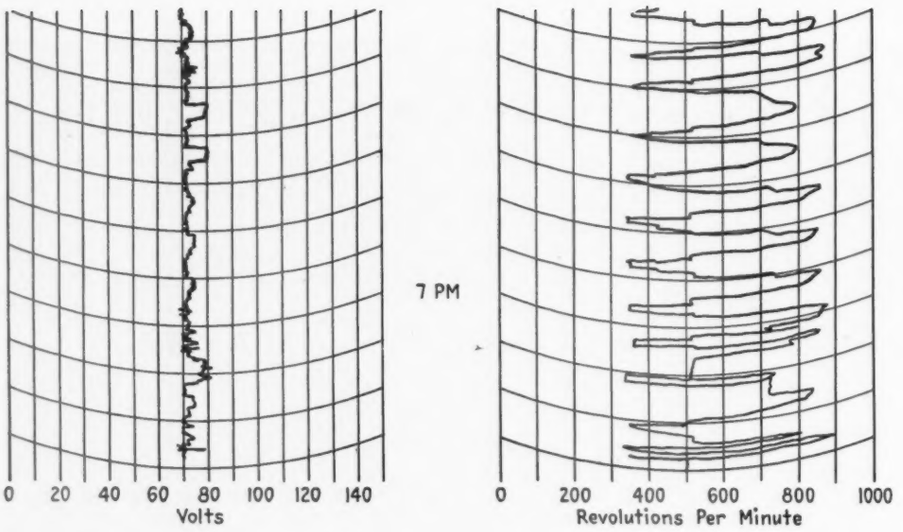


Fig. 7—Record of preliminary test showing the performance of the regulator before final adjustment. Left: regulated voltage. Right: speed of auxiliary generator

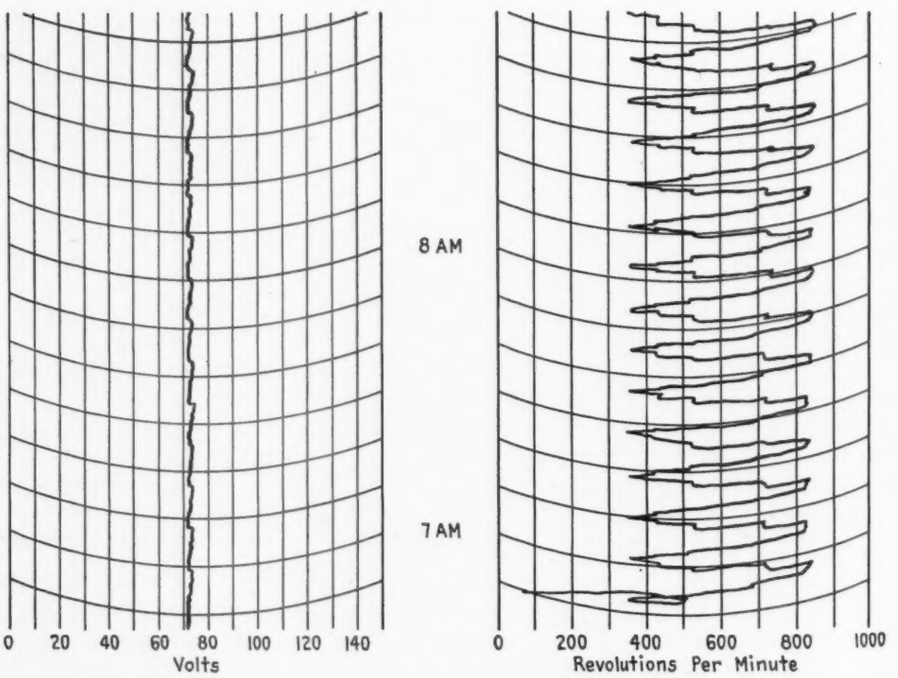


Fig. 8—Regu'ator performance after final adjustment

d. One *on-off* pushbutton unit control-circuit switch.
e. One *on-off* pushbutton unit for the d.c. motor starter.
f. A control-circuit pilot light.

5. The relay control panel includes time delay relays for controlling the variable generator speed and load changes described in sections 1 and 2. (See wiring diagram and parts list.)

6. A General Electric duplex inkless type recording meter for generator voltage and r.p.m., voltage scale 0-150 d.c., r.p.m. scale 0-1000. (See parts list for specifications.)

Operation of Test Rack

1. Mount regulator to be tested in rack and make all electrical connections to regulator.
2. Switch on control circuit.
3. Start motor generator set.
4. Set selector switch for manual operation.
5. By selection of proper speed and load control switches, set generator speed at minimum and load at maximum, allowing equipment to run until the temperature of all parts becomes constant. When starting with equipment cold, the voltage as shown by recording meter will be low. It will gradually rise as the operating temperature of the equipment increases and will level off when normal operating temperature is reached.
6. Reduce load on the auxiliary generator to minimum by selection of the proper load control switch, and adjust the speed to about 500 r.p.m., as shown on recording meter.
7. Adjust voltage regulator to a nominal setting of 74 volts in accordance with manufacturer's instructions.

(*Continued on page 86*)

DIESEL-ELECTRICS—How to Keep 'Em Rolling

9 Inspection and Tests—Gears and Pinions

Not only will gears and pinions have long life when they are given the attention all precision machinery deserves, but many road failures will be eliminated and other equipment protected from shattering vibration

Too little is known and done about this important piece of locomotive equipment.

Have you ever looked at the shape of your gear teeth? It takes only a moment, but it pays big dividends. It is better than any other one move you could make to check on the welfare of your traction motors.

This is the ninth of a series of articles on maintenance of diesel-electric equipment. This article is written by J. W. Teker, Locomotive and Car Equipment Department, General Electric Company, Erie, Pa.

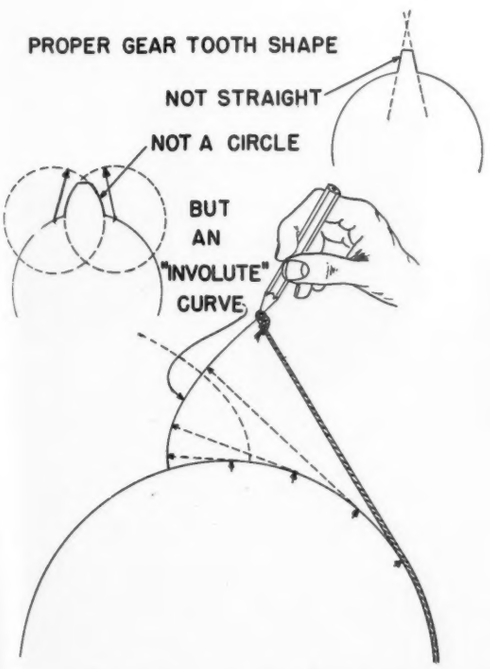


Fig. 1—How a gear tooth is formed

Poor Gearing Invites Troubles

Many a motor failure has been hastened by punishment from bad gearing. Damaged gear teeth not only hurt themselves but, like a toothache, spread their misery all around. We are concerned about bad gearing because of what it may do to the motor. Let's see how this happens.

The gear is shrunk on the axle, and turns steadily as the wheel rolls on the rail. It just doesn't have any choice, unless the wheel slips. Each bad gear tooth bumps the pinion and kicks it into a jerky, vibrating motion. As the pinion goes, so goes the armature and all its parts. Also, these same kicks are carried through the bearings and shake the motor frame and all it contains. At full speed, believe it or not, more than a million blows are struck every 30 minutes! Figure it out for yourself,—take motor r.p.m. and multiply by the number of pinion teeth to get blows per minute. No wonder gear-builders strive to shape teeth accurately. No wonder they worry about thousandths of an inch, in order to get gearing that will pass power smoothly between the motor and the driver.

The Fine Points of Gearing

Gearing is very clever and exact machinery. The maintainer's job is to keep it that way. Remember this when you are checking gear teeth, and don't be fooled by their

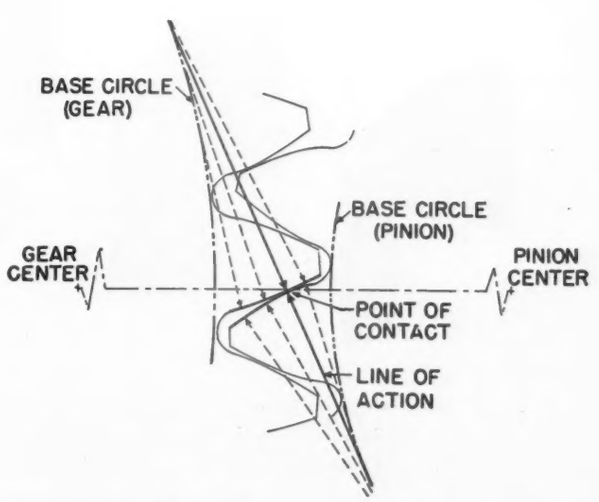


Fig. 2—How gears transmit power

simple appearance. The entire secret of smooth working gears lies in the shape of the tooth. It's not straight, and it's not round. It has the smoothly changing shape of an "involute" curve. This curve has an increasing radius, as if it were drawn by a pencil on the end of a string unwinding from a cylinder (Fig. 1). Try it for yourself.

This tooth shape is the exact part of gearing, and the way it works to get smooth motion is really amazing. The diagram in Fig. 2 will make this clear. As long as the teeth are in mesh, the points of contact between them are always in a straight line,—the line of action, Fig. 2. This line goes from around the base circle of the gear over to the point of contact. Here it merges with the contact line of the other tooth which goes to the base circle of the pinion. These two lines of contact join to form the straight line of action between the two base circles. As long as the teeth keep their proper shape, they push along the line. This turns the two base circles steadily, as if they were connected by a non-slipping belt.

Clever and exact as this machinery is, it does have a weak spot. The teeth slide on each other as they drive the locomotive. So, like a bearing, they must be separated by a lubricating film. Otherwise, metal will rub on metal and scuffing, overheating and destructive wear will start at once.

Maybe you find it hard to believe that gear teeth really slide. The model in Fig. 3 was photographed to show this. You can see how fast the teeth slide when they first enter mesh, by comparing (a) and (b). Then they slow down to a rolling or rocking motion in the middle of the mesh, (c). This is the point where the line of action crosses the center line between gear and pinion, (Fig. 2). Then they slide apart with increasing speed as they leave the mesh (d) and (e). You can actually see this sliding. Chalk the sides of a couple of teeth and draw some pencil lines across them. Then follow their movement as the gear is turned slowly. Don't be satisfied until you see this for yourself. If you keep this action in mind, you will understand how gear teeth wear.

You know how a wheel will run smoothly for thousands of miles, but let it slide for only a short distance, and it will have a flat spot. After that it thumps and

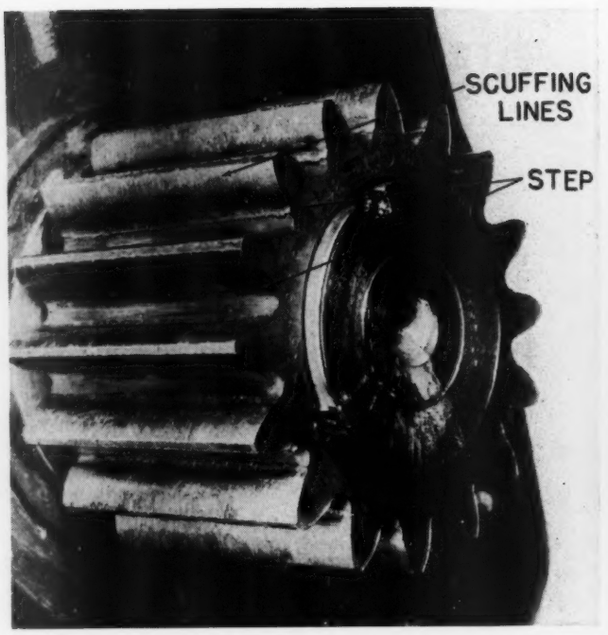
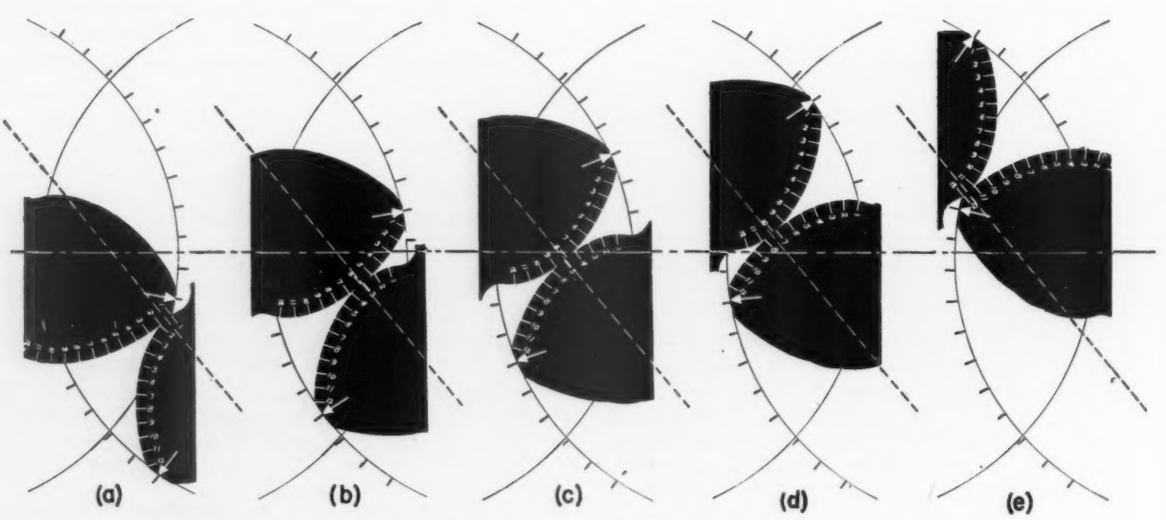


Fig. 4—Worn pinion showing step and scuffing lines on teeth

pounds with every turn. Similar damage results to the accurately shaped gear teeth if they are not properly lubricated. Because sliding is greatest towards the tip and base of the teeth, these portions wear fastest. The result is that two flat-like areas are worn into the face of each tooth. It is this uneven wear from tip to base that changes the all-important shape of the teeth, (Fig. 5). It not only leaves a ridge where the teeth roll on each other, but also digs a step at the base of the teeth. Instead of thumping only once with each turn like a flat wheel, defective gears pound with each tooth contact. Just count the teeth on a gear to get an idea of what rapid fire hammering this is. And remember, it gets worse as train speed goes up.



(a) Teeth entering mesh. No. 1 marks on both scales correspond
(b) Teeth approximately 1/3 through mesh. Scales show that upper tooth has slipped 3 divisions over lower tooth
(c) Teeth half through mesh. Scales still displaced about 3 divisions. Teeth have been rolling from (b) to (c)
(d) Teeth approximately 2/3 through mesh. Displacement still about the same. Teeth have continued to roll.
(e) Teeth leaving mesh. No. 12 scale marks correspond. Lower tooth has slipped 3 divisions over upper tooth

Fig. 3—Diagram illustrating action of teeth in going through mesh

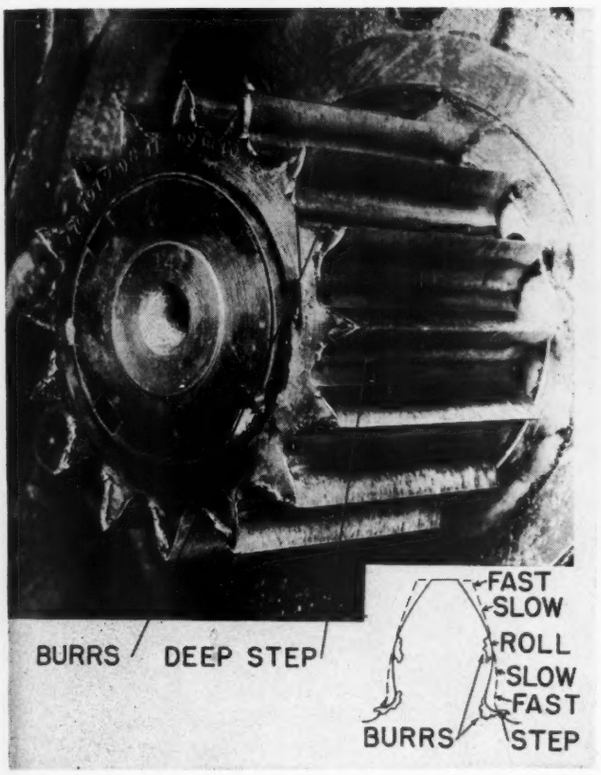


Fig. 5—Example of bad tooth wear resulting from lack of lubrication

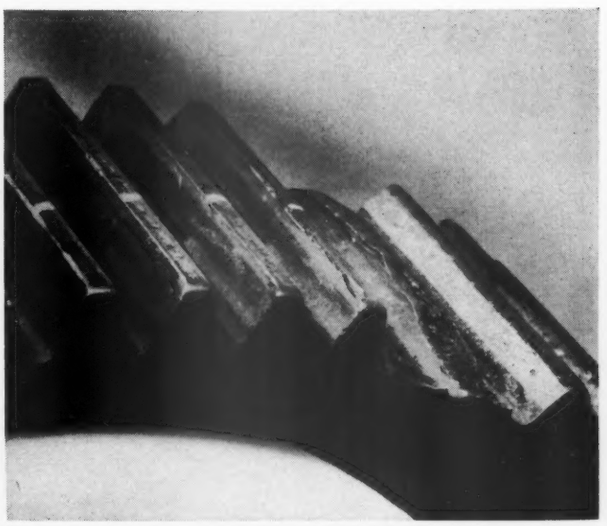


Fig. 6—Traction gear with two broken teeth

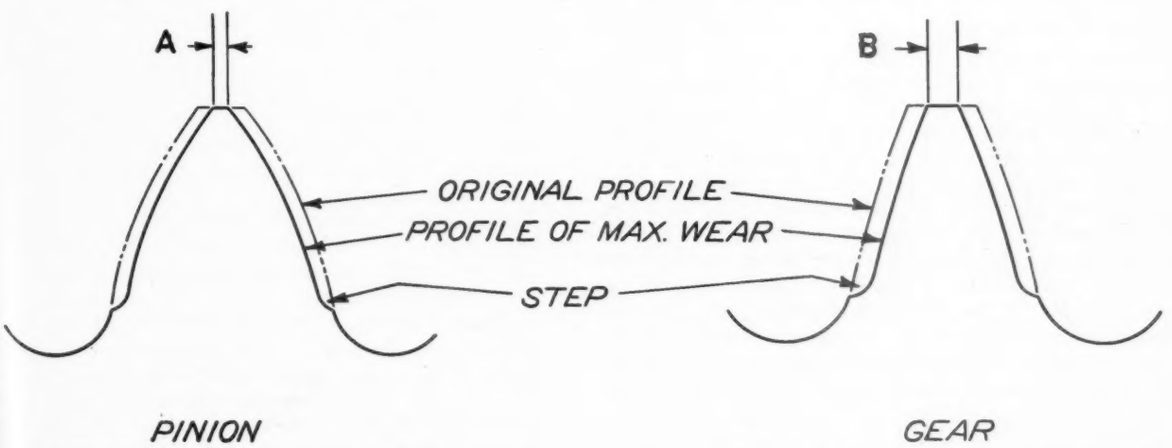
Keep Good Tabs on Gearing

Every wheel change is an opportunity to inspect the gear and pinion. Of course, they're covered with sticky lubricant. But don't let that hide the story the gear teeth want to tell. You only need to clean a couple of teeth to find out what's going on. Be careful how you do it, though. The black film may hide jagged edges or razor sharp burrs. It's best to wear gloves and apply the solvent with a brush or plenty of cloth.

A damaged tooth profile will show a ridge across the face of the tooth. Some maintainers like to use templates or gages to help them judge the shape of the tooth. These are accurately ground to fit correctly shaped teeth. When such a template is placed against the face of the tooth being inspected, the change in shape is easily seen.

The big question is when to reject gearing with defective tooth shape. A whole lot depends on the kind of service, the amount of wear, gear breakage and motor repair history. In general, gearing for fast road service should be maintained to higher standards than gearing for switching duty. Speed makes a lot of difference. Here's why. It takes only a small force to slowly rock an armature back and forth. But the force required to jerk it back and forth the same distance at high speed is terrific and punishing. Worn gears that might get by in low-speed switching work may result in a whole series of costly motor repairs if run in high-speed service.

Now look at the step worn at the base of the tooth (Figs. 4 and 5). It does no harm as long as the same gear and pinion remain mated on the same gear centers. One has worn a pocket for the other, so they run all right. But if the axle linings are changed, or the gears are interchanged—watch out! Then the step interferes with the



Dimetral Pitch of Gearing	Condeming Limits A	B
2 (or coarser)	1/16 in.	1/8 in.
2 1/4	1/16 in.	1/8 in.
2 1/2	1/16 in.	1/8 in.

Dimetral Pitch of Gearing	Condeming Limits A	B
3	1/32 in.	1/16 in.
3 1/2	1/32 in.	1/16 in.
4 (or finer)	1/32 in.	1/32 in.

Fig. 7—Condemning limits for worn teeth

Fig. 8—Fatigue cracks and ultimate breakage of gear teeth

tip of the tooth on the mating gear. That means crunching and battering of steel against steel, that no lubricant can help, until an uneasy agreement is reached. Worse yet—carefully built new gearing is ruined when run against bad gearing. Such costly, high-power machinery was never intended to operate under these conditions. It should not be surprising if a tooth breaks out, or if armature parts or windings fail.

Check on Lubrication

Rather than wonder how much destruction the gears can stand, wouldn't it be better to let these inspections serve as a check on lubrication? Suppose, for instance, you find no step, the tooth face is smooth and the profile is in good order. Most likely enough lubricant is being added at the right time. Of course, there is the chance of wasteful practice, with over-ful or leaky gear cases.

On the other hand, suppose you find worn gearing. Even though the teeth are covered with lubricant when you make the inspection, you find a step. There are also strong tell-tale scuff marks running from the base to the tip of the tooth face (Fig. 4). This could mean that the gearing was working dry for some time. Then, shortly before it was inspected, enough lubricant was added to cover the teeth. If this is a general condition, it may mean that not enough lubricant is being added, or that the interval between fillings is too long. Maybe both things happened. Maybe the lubricant is not suitable. Maybe too much was lost from the gear case between fillings. If the failure of lubrication was long ago and lasted only a short time, the scuff marks will be faint and polished, and there will be hardly any step.

Watch for Danger Signs

The whole object of gear inspection is to study evidence. Then, if you know how gearing works, you can make a shrewd guess as to the cause of the trouble.

Fig. 9—Pinion showing light pitting at base of teeth

Fig. 10—Gear teeth severely damaged by progressive pitting

Continual wear reduces the thickness of the gear teeth. The step cuts deeper and deeper into the tooth (Fig. 5). Even the ridge is crushed or rolled away. This causes a sharp burr to stick out at the sides of the tooth, in line with the ridge, as the rest of the face wears away (Fig. 5). Watch for this. Of course, the space, or backlash, between teeth gets greater as the gears wear. Such gearing may be quite noisy, and may make quite a "clunk" when it is reversed. But, the greatest concern now is the danger of a tooth breaking out.

Metal, like people, gets tired when overworked. If its "endurance limit" is exceeded too often, it will break. This can happen to a gear tooth sticking out from the rim. Originally, it was built strong enough to take the bending strain that goes with the service it was designed to perform. But, when wear cuts the size of the tooth down, it is weakened. Then the battering of step interference, plus blows from the damaged profile gang up on the poor tooth at high speed. What can you expect? A crack starts, usually at some surface defect. It is small at first, but grows down into the body of the tooth. When the weakened section gets small enough, the tooth suddenly breaks off (Fig. 6). This takes time, and perhaps you will have a chance to discover the crack before

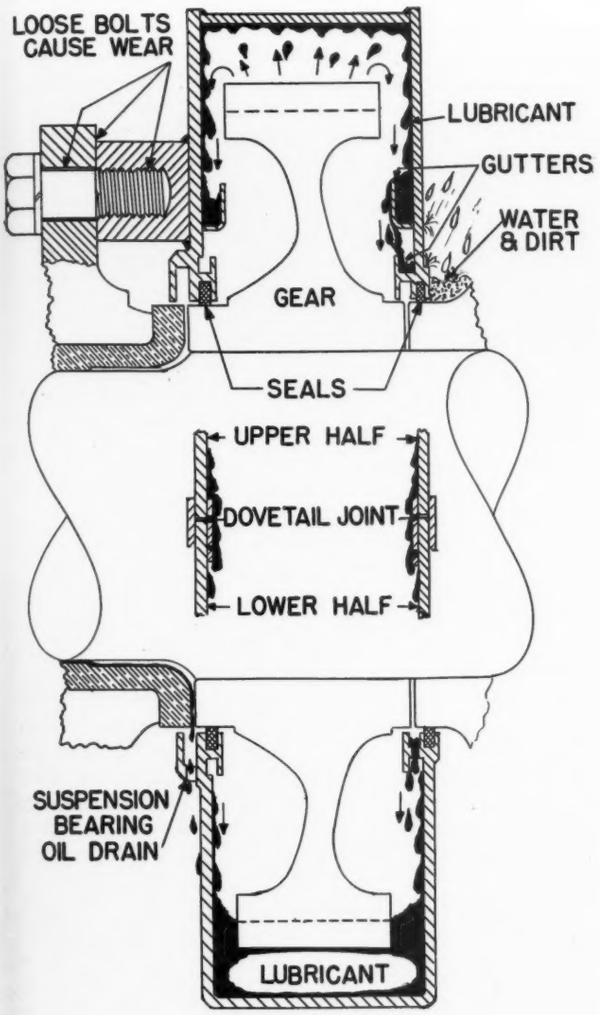


Fig. 11—Section through typical gear case.

failure occurs. Of course, when you're checking for cracks, all teeth must be cleaned of lubricant. Magniflux or similar detection methods are helpful in locating such faults.

Gearing should be condemned and removed from service before it breaks. Just when to do this is hard to judge with certainty. What damage is the worn gearing doing to the motor? How much longer will the teeth last? These questions can only be answered in a general way. The table in Fig. 7 shows condemning limits for gear teeth according to their diametral pitch. To get the diametral pitch, divide the number of teeth on a gear or pinion by its pitch diameter in inches. This is a handy way to classify the size of gear teeth.

Examples of cracked and broken teeth are shown in Fig. 8. Gearing should be condemned as soon as cracks reach to, or extend around, the ends of the teeth.

Occasionally, tiny pieces of steel will flake out of the face of the tooth leaving holes (Fig. 9). This is called pitting. It is caused by very heavy loads concentrated on these small areas. New gears are more apt to pit because high spots in the surface finish are being crushed out in service. Another reason for pitting is shaft deflection under load. Very heavy starting loads tend to deflect the pinion shaft and skew the contact with the gear teeth. This overloads the contact area close to the motor. Pitting takes place until the contact area is spread over enough of the tooth face to reduce the load. After this, pitting should cease and finally clear up. It is a kind of fitting-in process, especially where heavy loads are usual, and should cause no alarm.

If pitting should continue until large pieces fall out of the tooth, it is a different matter (See Fig. 10). The gearing should be removed from service before it has been weakened enough to fail. The working surface of such gearing is unable to carry the load that was put on it. Gather all the information you can to help determine the cause of the trouble. How long did the gearing run? What kind of service was it in? What was the lubrication history? What does the gear or pinion with which it was mated look like? Measure the hardness—it may be soft from overheating. If it is a pinion, it may have been overheated when it was mounted. Also, gearing gets very hot when it is run without lubrication. You know what would happen to a journal bearing running dry. Of course, soft gearing is not able to carry the load intended for properly hardened and heat-treated teeth.

The Job of the Gear Case

The gear case, simple as it is, does several important jobs for the gearing it houses. It keeps flying ballast out of the gear teeth and protects them from bumps. Look for dents in the gear case deep enough to rub on the gearing. Also look for punctures and broken welds that may let lubricant escape.

The job of keeping lubricant in the gear case is a tough one. Don't underestimate it. When heated to operating temperature, the lubricant flows like a liquid; yet it clings to and creeps along all surfaces. It is thrown off the spinning gears and then flows back to the bottom of the case along the side walls (Fig. 11). It must get by the horizontal split in the case and around the gear hub without escaping. Gutters around the hub opening deflect the lubricant away from the running seals to make their job easier. See that these gutters are not flattened or broken loose. Also, the dovetail joint between the upper and lower halves of the case must be snug. These may seem like small items, but they are important. Check the spring or latch on the filler opening lid—also the seal material is tightly closed. Lubricant can be lost here so fast that the level may get too low before a run is finished. Splattered trucks and underbody are your first clues to bad order lids.

Don't overlook the space between the gear case and the motor. Careless filling, or leaking of the lubricant may plug this space or the motor air vents. This interferes with the cooling of the motor windings and bearings.

Felt seals are used for closing the gap between the gear hub and the case. These should be soft enough to make a good rubbing seal. Felts that are hardened or shriveled after the gear case has been washed in caustic solutions should be replaced. Don't forget to check the felt on the filler lids too. If these seals are not tight, water and grit will enter and mix with the lubricant. This will form a lapping compound—just like throwing sand in a journal bearing.

It is also important to see that the oil catching trough drain is clear. This lets the surplus oil from the thrust flange of the suspension bearing drain clear of the gear case. If this oil got into the gear case, it would dilute the lubricant and make it unfit to do its job.

Check all the bolts holding the gear case to see that they are tight. Use a hammer the same as on axle cap bolts. If the gear case is allowed to jiggle, the supports, bosses

and bolts will wear. This leads to costly back shop repairs.

The gear case is as important to the traction motor as the crankcase is to the diesel engine. Each part has a job to do. Performance depends upon how well that job is done. A neglected gear case may wreck a set of gears. These, in turn, may punish an armature to failure. There are cases on record of repeated armature failures and changeouts until attention was called to defective gearing. When this was removed, the armature failures stopped.

You Reap What You Sow

The better you understand gearing, the more you respect it as a remarkably accurate and dependable piece of machinery. Give it the attention and care worthy of such machinery and it will give you long and faithful service. Even if neglected and abused, it continues to haul trains, but protests by kicking and shaking for a long time, everything connected with it. Yet gearing is long suffering and continues to warn you until it fails. If you take heed, you may have time to correct the trouble. Otherwise you can expect costly repairs, if not irreparable damage. Remember, you reap what you sow.

Test Rack Improves Locomotive Operation

(*Continued from page* 80)

8. Allow equipment to operate at this setting, under constant speed and constant load for about 20 minutes. The voltage and speed recorders should show straight lines.

9. Return all manual switches to the *off* position.

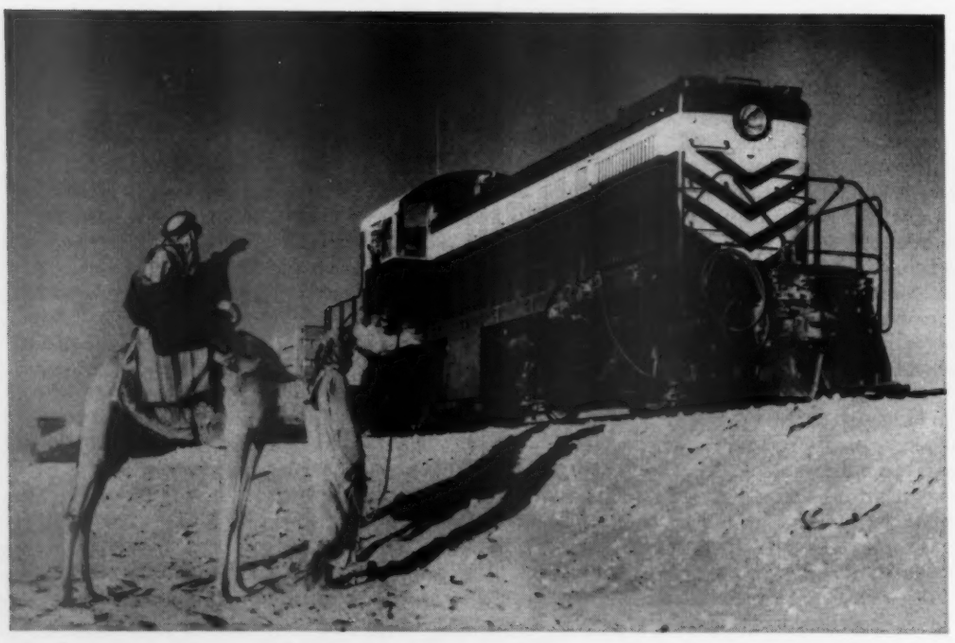
10. Turn the selector switch to the automatic position, starting the automatic cycle of speed and load changes described above. The pattern made by the recording voltmeter will indicate the condition of the voltage regulator.

Since this test rack was placed in service, regulators reported as defective by maintenance electricians, as well as regulators removed from diesel units undergoing heavy repairs, have been tested. These regulators have varied in age from nine years to two months with no record of any previous overhaul. Where regulators have shown poor performance, a thorough examination has revealed a wide variety of causes, including:

Open resistors.
Excessive play in linkage.
Excessive friction in the dash pot.
Worn pivots—both pins and bearings.
Lack of lubrication in torque motor bearings.
Pitted ball bearings in the torque motor.
Excessive end play in the torque motor shaft.
Grounded commutators.
Short circuited bars on commutators.
Grounded torque motor leads.
Open voltage-adjusting resistor.
Burned and pitted commutators.
Burned and pitted carbon rims.
A broken sector of the spring stud.
Grounds caused by dirt and carbon dust.
Faulty or loose electrical connections.

All regulators on the Coast Line system are to be serviced at the Waycross Shops. Regulators are completely disassembled and thoroughly cleaned. Any defective or worn parts are replaced. After assembly, they are placed on the test rack for a test of voltage stability and final adjustment of dash pots and linkage. Recording meter charts are marked with serial numbers of regulators and dates of test.

From the limited experience gained since this test rack was put in operation, the need for periodic reconditioning of voltage regulators has definitely been established. Experience may indicate that improvements can be added in the future, but to date, it has demonstrated that the effectiveness of shop overhaul of voltage regulators can only be proven by the final test for voltage stability made on the voltage regulator test rack.



An ancient mode of travel makes way for the modern in Saudi Arabia. Saudi Bedu and their camel (hp. unknown) wave to the engineer of an Alco-G.E. 1,000-hp. diesel-electric locomotive along the right-of-way of the Saudi Government Railroad near Hofuf, Saudi Arabia

Road Tests Show the Way To Better Locomotive Performance

Missouri-Kansas-Texas makes tests and studies of diesel locomotive performance which benefit both maintainers and designers

By C. H. Griffith,
chief electrical engineer, and
E. H. Pfeil,
assistant electrical engineer, Missouri-Kansas-Texas

CERTAIN difficulties have been experienced with diesel-electric locomotives on the Missouri-Kansas-Texas since the first road service units were placed in operation during 1947. With four different makes of locomotives, totaling 197 units, operating on 3,242 miles of railroad, furnishing the basis for the observations outlined, it can be assumed that similar difficulties have been prevalent on other railroads of comparable or greater size and diesel ownership. Any criticism offered should be considered constructive as it is given sincerely and with a hope that it may be of some benefit to manufacturers and users alike.

Main Generator Commutation

With one group of 21 road freight units starting service in June and July, 1947, we had a marked pattern of generator commutator bar discoloration followed by bar etching and flat spots which necessitated the resurfacing of the commutators on all units. This trouble developed when locomotives had been in service five to six months, and had operated approximately 80,000 miles. It is believed that it was caused by the improper functioning of automatic transition and possibly aggravated by commutator eccentricity.

Since the commutators were resurfaced and automatic transition modified so as to eliminate the cycling between series parallel shunt and parallel motor connections, we have experienced no similar trouble, the commutators now being in excellent condition after more than 700,000 miles of operation. Another modification made on these units was a change from closed circuit to open circuit transition. At the same time, current values for controlling backward transition were increased approximately 500 amp., thereby reducing the number of motor connection transfers—these changes, we think, were an aid in the elimination of commutator trouble.

On another group of 18 road freight units placed in service from November, 1948, to March, 1949, we had considerable trouble maintaining commutator surface due to threading and copper drag which tended to produce flashovers. These generators had commutators of the open riser type which were difficult to keep clean principally because the air drawn through the generator by the generator blower was laden with oily vapor collected in the air stream in passing over the top of the engine. These oily vapors made it difficult to keep the front and rear "V" ring string bands clean, thereby producing a condition which was contributory to flashovers.

These conditions have been improved by changing the grade of brush, reducing the number of brushes per holder to obtain greater current density and by blocking of some car body filters to change the air flow pattern in the engine room. In this case, we think the first two changes mentioned contributed most to relieving the trouble.

On a third group of 20 road freight units, placed in service during July, 1949, we are having quite a few flashovers which we attribute principally to oily vapors being blown through the main generator and collecting on brush holder insulators. These oily surfaces collect carbon dust, and thereby furnish a path to ground. These particular units are of the same manufacture as the first group mentioned, but are of a later design and model. In the modernization of these units, the manufacturer reduced the number of car body filters 33⅓ per cent and applied louvers which gave the locomotive a much better external appearance. The filters eliminated were at a location in the end of the car body where we have the major portion of our engine room air requirements; namely, engine air, generator blower, front traction motor blowers and air compressor. With the reduction in the number of filters, the restricted air flow through the louvers, and the revision of filter location, it is evident that some of the generator blower air must be supplied from the air stream passing over the top deck of the engine.

On one of these units, we recently had a fire in the main generator—a fire which might be classified a "trash" fire, as inspection disclosed the fact that the burning material was an accumulation of grease which had evidently been ignited by a severe flashover, and fanned by the generator blower. Fortunately, the damage was negligible as a maintainer who was riding the locomotive took the unit off the line, shut the engine down and extinguished the blaze with fire extinguishers. When the generator was removed and thoroughly cleaned with ground corn cobs, we found no serious damage—merely the burning of approximately one square inch of outer insulation on a compensating field connection.

These oil laden vapors produce a gummy condition in the brush holders which in turn is apt to set up ring fire and eventually a flashover between brush holders of opposite polarity.

From a paper presented before the South West Distict Meeting of the American Institute of Electrical Engineers held in St. Louis, Mo., April 15-17, 1952.

Fig. 1 (left)—Calibrated test leads with heavy duty connectors permanently attached to the test car. Fig. 2 (right)—Test cables connected between the test car and the locomotive

To alleviate these troubles, we have now initiated a program of installing six additional standard car body filters in each unit, located in the area of the maximum air demand.

With this particular type of locomotive, we are operating the main generators at greater temperatures than those of the older type, as a considerable quantity of air is being recirculated through the generator.

Switch Gear and Control Equipment

On one class of locomotive, we have had many locomotive unit failures due to poorly designed contacts on the switch used for the transfer of motor connections from power to braking. These contacts cannot be made trouble free with any reasonable amount of shop maintenance, and have been responsible for many train delays and tonnage reductions.

Another item that has caused much trouble from a maintenance standpoint is the design of interlock contacts. On one make of locomotive, trouble from interlock contacts has been negligible, while on a competitive make of locomotive, this very important item has been the cause of numerous delays and costly maintenance.

A third problem that has caused concern on the part of maintenance forces is the type of equipment used for transition control. On one make of locomotive, control is by use of an axle generator which transmits a wheel speed signal to three or more relay panels which control motor transfer switches. A special drive and test meter are required for satisfactory checking of this equipment. With all of this, maintenance is often reduced to guess work due to the fact that road operation is difficult in the shop.

As a contrast, equipment performing similar control functions on another make of locomotive has been reduced to three rather simple relays. Special equipment for testing in this case involves a small motor generator set and voltmeter. With this equipment, very few cases of trouble have been experienced that cannot be definitely corrected in the shop.

The point here is not to champion any one make of equipment, but to remind ourselves that from a railroad maintenance point-of-view, the simplest method of accomplishing a given result is generally the best. This, we believe, is true even though the final accuracy of the simpler method may not be as close as a more involved and costly method. Much help could also be given maintenance forces by the manufacturers in prompt correction of recognized faulty designs.

Control equipment on some locomotives is installed in such a compacted mass that it is almost impossible to reach some devices or terminals to clear faults which develop. These places are not necessarily inaccessible during the construction at the manufacturing plant, but are rendered so when the hood or housing is placed over them. If designing engineers had the responsibility for maintenance, we believe they would give more thought to the accessibility feature.

Traction Motors

On one particular make of traction motors, we find it necessary to grind commutators at 150,000 to 200,000-

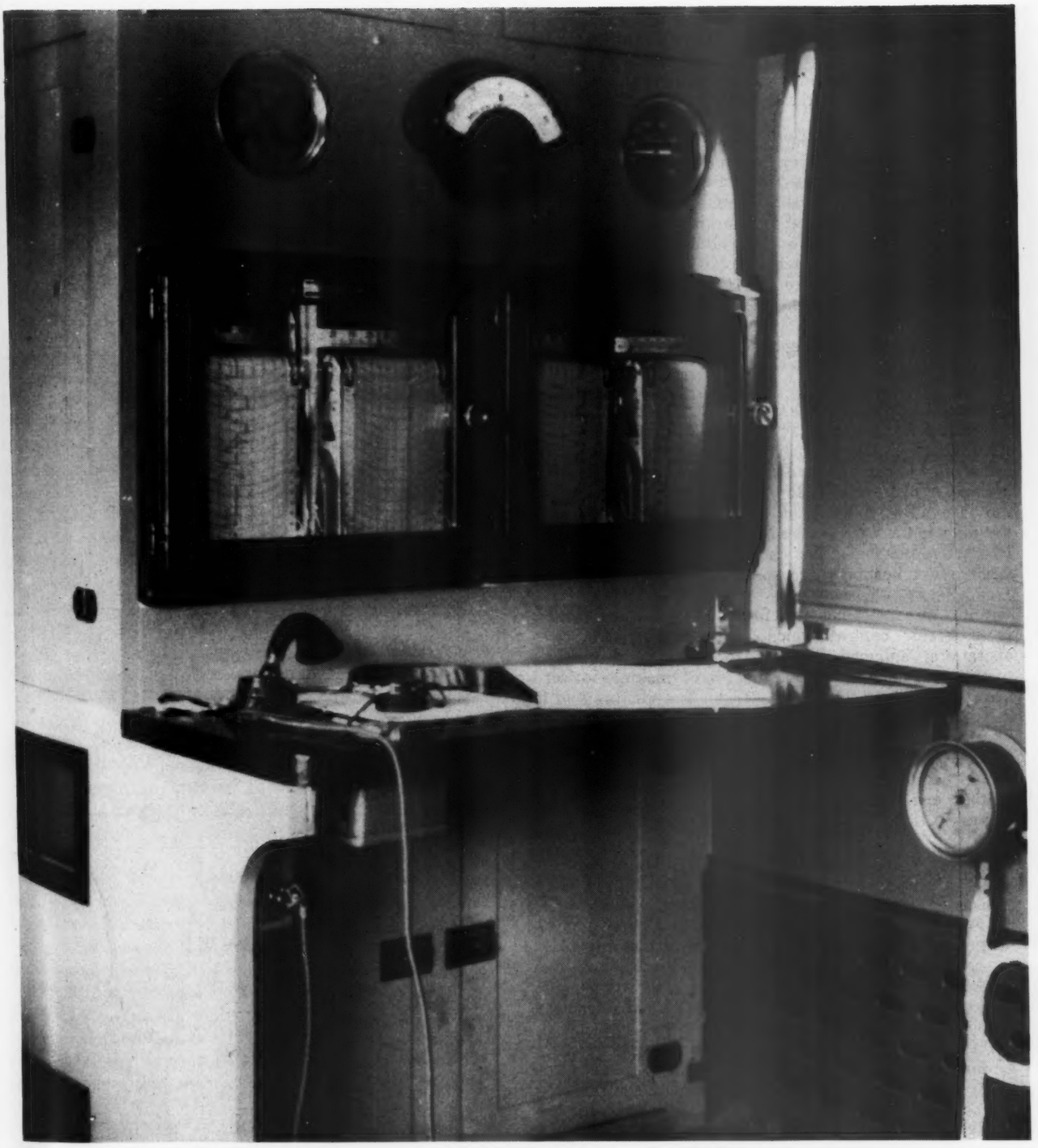


Fig. 3—Test cabinet with two twin graphic instruments and telephone

mile intervals while on two competitive makes we do not have a similar condition. These commutators, when checked with a dial indicator, show variations up to 0.012 inch, and vary between the three brush tracks. Commutator surfaces show a series of flat spots which may span several bars and very seldom extend across the entire commutator face. The manufacturer attributes this condition to stall burns, but we are at a loss to understand why similar conditions are not prevalent on other makes of locomotives operated by the same personnel in identical service unless it is on account of differences in load control methods.

"On the Road" Testing

An all-steel passenger car, fitted by the railroad for testing diesel-electric locomotives, has an instrument or office room, sleeping accommodations for nine people, kitchen, dining room, and a room for the attendant.

The forward end of the car contains a cabinet, with desk attached, in which are mounted two twin graphic

instruments (generally operated at a chart speed of 12 in. per hr.), containing the following elements: (See Fig. 3)

Watt meter—for recording main generator output.
Speed recorder—operating from generator, belt-driven from car axle.
Voltmeter—for recording main generator voltage.
Ammeter—for recording traction motor current.

Each instrument is fitted with two chronograph pens, one on each being operated simultaneously by a push-button, and generally used for marking mile posts on the margin of the charts. Two of the other chronograph pens record service and emergency brake applications.

A telephone heat set and chest transmitter is located at the desk in front of the instruments and is used for communication with one or both cabs of the locomotive by the use of portable telephones.

Test Leads

Test leads, calibrated with the instruments are in two parts, and fitted with heavy duty connectors. The portions attached to the instruments are permanently installed in the car and lead out through the vestibule for convenient connection to the portion of the cables used on the locomotive. All road locomotives are fitted with openings in the nose section for the accommodation of the locomotive portion of the cables which are secured with strain relief bushings and special lock nuts. (See Figs. 1 and 2)

With these instruments we found an undesirable feature in generator control which caused the generator to operate at subnormal rating for seven and one-half minute periods during the process of making forward transition on traction motors. When this was brought to the attention of the manufacturer's representatives, we were told they had delivered large quantities of similar locomotives to larger roads and had never received similar complaints from them. This trouble was overcome by their engineers, but would probably have been passed unnoticed if we had not registered a complaint.

Correcting Cycling Trouble

In another case, we had trouble with cycling from transition 2 to 3 and back to 1. To correct this trouble the manufacturer's Engineering Department made a modification which was applied to all units of that class. At the completion of this modification, the performance had not been helped, but by continuing our tests with graphic instruments one of their engineers in the field solved the problem and eliminated the trouble.

On a recent lot of locomotives with 80-m.p.h. gearing, we found that we had a severe sagging in the horsepower curve at 50 to 55 m.p.h., whereas the design curve showed this break in the curve should not occur until we reached a speed of 69 m.p.h. As was the case with another make of locomotive, we were told that many similar units were sold to other roads, who made no complaints of this nature. The latest advice we have on this matter is that through some miscalculations in the Engineering Department, traction motor field shunting resistors of improper values were applied.

In our opinion, we have obtained invaluable information by road testing with graphic instruments in our test car and have detected shortcomings which could never have been found by load testing devices in the shop. Both types of testing are considered essential on our road.

We have always cooperated with manufacturers in test projects and feel that our findings have been beneficial to both of us, and the industry as a whole.

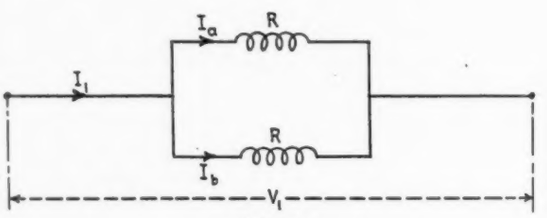
CONSULTING DEPARTMENT

Field Coils for Motors Of Different Voltage

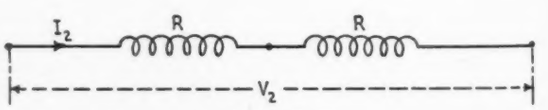
When two shunt motors have the same rating, and their voltages are in the ratio of 2:1, is it possible to use the same field coil for both machines?

Yes, if the coils are connected in series across the line in higher voltage machine, and in parallel across the line in the lower voltage machine. For example, assume that the machine is a 2-pole shunt motor.

Let the required ampere = turns = NI
Each field coil resistance = R
Each field coil turns = N
Voltage across line = $V_2 = 2V_1$
Total field loss, watts = P_f



Motor 1



Motor 2

A. Field Calculation:

$$I = I_b = \frac{V_1}{R}$$

$$\text{and } I_2 = \frac{V_2}{2R}$$

$$\text{but } V_1 = \tfrac{1}{2} V_2$$

$$\text{thus } I_b = \frac{V_2}{2R} = I_2$$

$$\text{Then field} = NI = \frac{NV_2}{2R} = NI_2$$

B. Field Loss:

$$P_f = V_1 I_1$$
$$= V_1 2I_a$$
$$\text{but } I_f = I_2$$
$$\text{then } P = V_1 2 I_2$$
$$\text{likewise } V_1 = \tfrac{1}{2} V_2$$
$$\text{so that}$$
$$P_f = \frac{V_2}{2} \times 2I_2 = V_2 I_2$$

L. T. LOFORESE
Safety Car Heating and Lighting Company, Inc.

EDITORIALS

Cashing in on Actual Experience

Over the long period of years that the steam locomotive was the principal form of motive power on the railroads of this country there were efforts made by many groups acting either independently or as committees of established organizations to effect some degree of standardization of general design as well as the design of parts but steam power is passing out of existence in much the same form that it came in. The designs of steam locomotives reflected the ideas of individuals and groups on the many separate railroads that specified general designs and proportions adapted primarily to the service of the roads for which they were built.

Variations in ideas and differences in service requirements were probably responsible to a major degree in the now-forgotten development that enabled the steam locomotive, in its final form, to establish many records for performance and in economy of operation. Actually, too, the degree of standardization of many important steam locomotive parts was carried, to advantage, much farther than many realize. Standardization is always a worth-while project but if carried too far, it is possible, as one railroad man expressed it, to standardize some errors, too.

The diesel-electric locomotive came into the picture in almost the exactly opposite manner in that it was pretty well standardized from the beginning. Its success so far has proved that the major idea of design was sound and it is only now that the many millions of miles of service experience are beginning to show up some weaknesses of minor parts that it may be desirable to change. Constant contact between the railroad users and the service departments of the builders have resulted in many changes that are now reflected in greatly improved designs.

It is to be hoped that as the individual roads build up service experience with diesel-electric power they will move with caution before making or requesting too many changes to be made in existing types of units. There is no denying the fact that many roads are having troubles, large and small, with many of the parts of the modern locomotives. Some of these troubles may be corrected, in the long run, by more operating experience and some of them may, in the end, require definite changes in design of parts.

Fortunately, for the railroads, we have the benefit of etstablished organizations in the mechanical field which can be used as a clearing house for ideas. If the working committees of these groups do a good job of rounding up, from the experience of member roads, a catalog of the troubles that need correcting; find out from as many roads as possible what individual steps have been taken to correct the troubles and then apply the force of group experience and a united front in making intelligent suggestions as to desirable changes, it should be possible continually to improve motive power without unnecessary expense. The intelligent use by the roads of proper committee work in mechanical organizations is one opportunity that has not been fully explored. It is an opportunity to cash in on experience in a big way.

Commutators Need Seasoning, Too

Is the fact that of all the railroads using diesel-electric locomotives only four so far have seen fit to install six units of a modern design of commutator seasoning machine an indication that the majority of roads do not fully appreciate the possibility, by such means, of assuring longer and more efficient traction motor life?

The question may be asked if railroads really need a machine they have been generally getting along without since the advent of diesel motive power. An answer is found in the action of four large users of diesels which have considered it worth while to install the machines at a cost up to $20,000 each, evidently because of some difficulties being experienced with traction motor commutation. Another indication that present commutator performance leaves something to be desired, under the arduous conditions of locomotive service, is the action of the new A.A.R. Electrical Section of the Engineering and Mechanical Divisions in recently assigning a committee to study this subject.

Not all users and maintainers of diesel motive power realize the extent to which traction-motor armatures and commutators, made of different materials with widely varying coefficients of expansion, expand and contract under the repeated heating and cooling cycles to which they are subjected in normal operation. Without suitable "curing," or seasoning in advance, it is hardly reasonable to expect commutator segments to stay sufficiently concentric and properly alined to permit satisfactory brush action in picking up the electric current.

Commutator seasoning normally involves applying heat with a gas flame while armatures are revolving at maximum speed until a temperature of about 320 deg. F., is reached, then cooling and tightening. In some

instances, the period of revolution of the armature while heated varies from 45 to 60 min. and another hour is required for cooling, also at full speed. This operation may be repeated as many as six times before the commutator is ground, assuring smoothness and concentricity of the commutator bars within close limits, both hot and cold.

During manufacture, commutator seasoning is a regular practice, and by the same token it would appear that it ought to be done every time the commutator is disturbed, whether by the manufacturer or the railroad.

The present general railway practice of simply baking and tightening commutators without the application of speed may be entirely adequate for small motors and especially those operating under relatively stable conditions of load and vibration, but the service demanded of diesel locomotive traction motors is an entirely different story requiring the best techniques both in new construction and repairs.

Heat or Vibration

Much effort is spent teaching—or in some cases trying to teach—railroad operators that overloading of diesel traction motors takes the life out of the insulation. The motors may take it for one trip, or thirteen or fourteen, and then fail on the fifteenth. Then the apparently logical question is, "Why did they fail on this trip when they worked all right on the other fourteen?"

Gradually, this is born in on the consciousness of the operators and then, if they happen to feel kindly toward the maintainers, they may cut off a couple of cars. Perhaps then trouble continues and it is discovered that the high temperatures were not caused by too many cars on a grade but rather by too many starts and stops in restricted territory. If it is passenger service, it may be found that the motors get hot at high speeds and this is contrary to what the operators have been told should never happen. Motors are supposed to get hot only at low speeds when current values are high. It is a hard school—often harder on the teachers than the taught.

But in recent years a high percentage of motor failures have occured when there was no evidence of overheating. There are insulation failures and broken coils, the destruction sometimes being so complete that the cause is obscured. However, it is becoming more and more evident that at least a considerable part of the failures were developed by vibration.

Self-respecting manufacturers of precision gears, with pride in their product, feel they are being imposed upon when they are required to put 500 hp. through an overhung pinion such as must be used on a diesel traction motor. The shaft must flex enough to cause appreciable misalignment of the gear and pinion. Then, if wear in the motor support bearing is allowed to become excessive and the grease gets too thick or leaks out of the gear case and steps are worn on the gear teeth, long-departed gear designers turn over in their graves.

The result is that the entire locomotive and especially the motors come in for an awful beating and having failed, get blamed for being weaklings. Some excellent information on how to avoid such calamities is contained in Chapter 9 of the "How to Keep 'Em Rolling" series in the Electrical Section of this issue. It will not correct circumstances, and it will not tell a railroad how much it can afford to take out of a locomotive in order to get more tonnage over the road, but it will help.

New Books

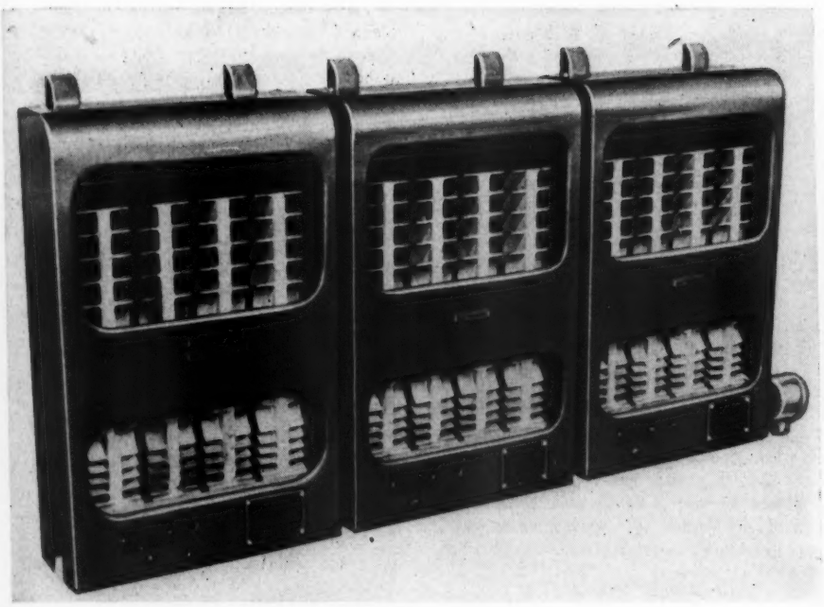
FORGING AND FORMING METALS. *By S. E. Rusinoff, M. E. Published by the American Technical Society, Drexel avenue at 58th street, Chicago 37. 279 pages, 5½ in. x 8¼ in., illustrated. Price, $3.95.*

Described in separate units in the sixteen chapters of this book are impact forging, press forging, upset forging, extrusion, heat treatment of forgings, cleaning and finishing of forgings, inspection of forgings, safety in the forge shop, designing a forged part, designing dies and tools, metal quality, and the selection of a metal for forging. Included also are a Glossary of Forging Terms and a chapter entitled "Standard Practices and Tolerances for Impression Die Forgings." The usages and specifications set forth in these sections are in accordance with those adopted by the Drop Forging Association. At the end of each chapter is a set of review questions, and at the end of the text an Appendix of Useful Tables and a selective bibliography. The book is profusely illustrated with photographs and line drawings.

ALCOA AN AMERICAN ENTERPRISE. *By Charles C. Carr. Published by Rinehart & Co., Inc., New York. 292 pages, 5½ in. by 9¼ in., illustrated. Price, $3.50.*

The story of Alcoa is presented as "a case history of a business which came to fruition under our American system." The author was for many years director of public relations for the Aluminum Company of America. All phases of Alcoa's history, whether or not they involved controversy, are included. The foreword discusses how the electrolytic fission of aluminum oxide by Charles Martin Hall in 1886 brought about the aluminum industry of the United States, spearheaded by the Pittsburgh Reduction Company. Chapter I is the story of Hall, interwoven with the name of Paul L. T. Heroult who influenced aluminum history in Europe through his inventions and whose process at times affected the American scene. Chapter 2 tells of Alcoa's Beginnings in July 1888 as the Pittsburgh "Aluminium" Company. A few weeks later the corporate name was changed to the Pittsburgh Reduction Company, and within a year the company had adopted "aluminum," the present American spelling of the word. In 1907 the company became the Aluminum Company of America. Succeeding chapters discuss the early struggles for patent rights, for financial backing and for consumer markets; the Anti-Trust Case; water power; research, etc. A chapter is also devoted to the part the Aluminum Company plays in the development of magnesium as a useful light metal.

NEW DEVICES



Convection Type Explosion-proof Heater

Designed for use in atmospheres containing gasoline, petroleum, naptha, acetone, benzol, lacquer, solvent vapors and natural gas, the 6,000 watt Electromode heater, made by the Electromode Corp., Rochester 5, N.Y., is approved by the Underwriters' Laboratories for use in Class 1, Group D hazardous locations.

Typical users are industries where flamable gases, mixtures, or highly flamable substances are manufactured, handled or stored in other than their original containers. It has found application in pump, valve, and meter houses, and personnel warming shelters.

Its safety-grid heating element consists of a nickel chromium resistor wire, insulated and sheathed in a seamless metal tubing and is embedded in a one-piece finned aluminum casting. The aluminum grid remains at a low operating temperature, but has high thermal conductivity. It will not rust or corrode and there are no liquids to freeze-up or run dry.

These explosion-proof heaters are made in three models with ratings of 2,000, 4,000 and 6,000 designated as models CX-2, CX-4 and CX-6, respectively.

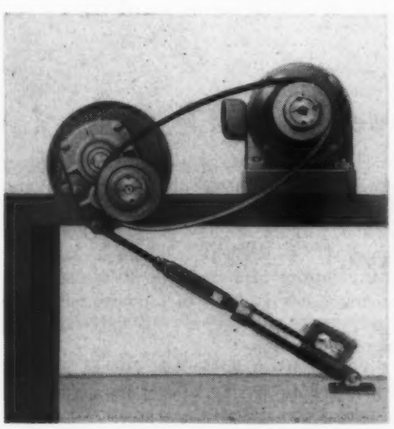
Speed Reducer Overload Release

An overload release for the Dodge Torque-Arm speed reducer, which provides protection for driven machines, motors and the speed reducer itself, has been developed by the Dodge Manufacturing Corp., Mishawaka, Ind.

The product has been named the Tri-Matic overload release and operates both mechanically and electrically to loosen the belts, cut off the current and activate a warning bell, siren or light.

Pressure exerted by an excessive load causes a piston to move lengthwise through the unit. This movement loosens belt and turns off current simultaneously. The warning system is hooked up to micro switch.

The device is calibrated for adjustment to the load conditions of any job. It can be set to act at any desired load up to the reducer's maximum capacity. To reset the unit after it has been tripped, it is easy to pull the speed reducer back manually into position. This automatically cocks the overload release mechanism.



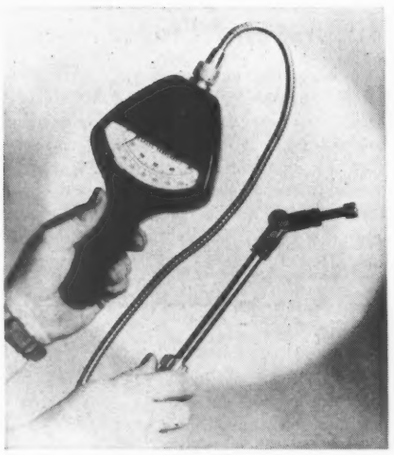
Blind Rivet

No heating, no bucking and no special tools are necessary on blind riveting operations with the introduction of the Pax Speedy Rivet, a product of Rail-Air Equipment Company, Los Angeles 29.

For insertion, only two operations are required: insert the rivet and drive the pin with an ordinary mechanic's hammer.

The devices can be used for riveting all types of framing, whether channel section, angular, tubular etc. that are supported by framing members. Railroad passenger cars can be reroofed without removing interior panels and fixtures thereby greatly reducing "out-of-service" days.

◆



Hand Pyrometer With Two Ranges

A hand pyrometer with two scale ranges for the rapid and convenient measurement of surface, liquid, gas and molten-metal temperatures has been announced by the General Electric Meter and Instrument Department.

Designated as the Type FH-1, the new pyrometer is especially useful where a temperature detector does not need to be installed permanently. Its two scale ranges are 0-500 deg. F. and 0-1,500 deg. F., and the change from one scale to the other is accomplished by the flick of a switch.

Three interchangeable tips include a surface tip, an immersion tip for liquids and molten metals, and a two-prong contact tip. These tips, together with flexible and rigid extension arms, can be easily changed.

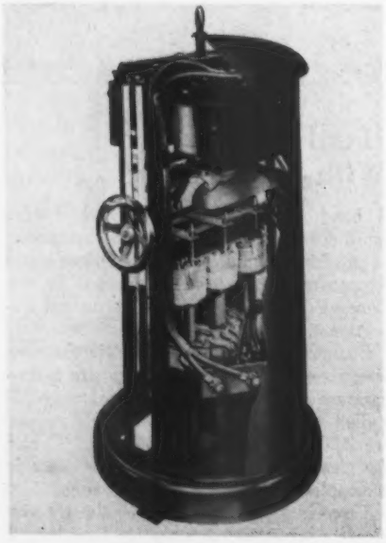
The automatic cold-junction compensation feature of the pyrometer eliminates the need for manual adjustment of the pointer for atmosphere. Readings can be made directly from either scale of the instrument since no calculations or corrections are needed.

Mechanical Door Opener and Closer

With the idea of providing a safe and simple method of opening and closing freight box car doors, Penco Engineering Company, 25 California Street, San Francisco 11, has marketed the E-Z-Way mechanical door opener and closer.

This device can be inserted and pressure applied up to 4,000 lb. at any height in the car doorway. It is light in weight, only 34 lb., and can be carried and operated by one man. It does not violate any of the safety appliance laws as it is not necessary to attach to any part of a car.

This unit consists of a short bar which fits into a ratchet housing. When swung back and forth, it slides the door open or closes it. The device will not jerk car doors off runners and cause the door to fall on an operator.



Rectifier Type D.C. Welder

A heavy duty direct current welding machine has been put on the market by the A. O. Smith Corp., Milwaukee, Wis. The machine is designed for all industrial uses, where d.c. welding is required.

Extensive field testing has shown the new unit to be free of stack failure. This is accomplished by directing a high velocity downdraft of cool air over the rectifier stacks before passing this air through other parts of the machine. The blast is expelled at the base of the welder. This assures proper cooling and promotes internal machine cleanliness.

All of the principal construction features of its heavy-duty a.c. welder are retained in the d.c. unit. Among these are the case-diameter fan and wind tunnel design to assure adequate, efficient air flow over all energized parts. The primary coils are raised and lowered on ball bearing jacks. The machine is available in 200-, 300- and 400-amp. ratings.

◆

Metal Parts Cleaner

A cleaning solution which can be used for the removal of carbonized oil and gums from diesel engine parts has been announced by the Magnus Chemical Co., Garwood, N. J. Known as Magnus 751, the manufacturer also recommends its use for cleaning corburetors, fuel pumps, pistons, rocker arm assemblies, rear and transmission parts, etc.

It is claimed to be safe for all metals, not attacking, pitting, or marring aluminum alloys, bearing metals, cadmium, solder or any other soft metal. The cleaner can be used in either hot or cold solution and is followed by a simple cold water rinse after the cleaning period. It is non-inflammable.

Where a large volume of parts has to be cleaned regularly, this cleaner works best when utilized in the Magnus Aja-Dip cleaner machine. In this unit, agitation speeds up the cleaning action. All traces of deposits are removed, making hand brushing unnecessary.

◆

Lubrication for Diesel Liners

A bonded to metal lubrication process termed Lube-Lok, made and licensed by its manufacturer the Electrofilm Corp., North Hollywood, Calif., is being applied to diesel liners for two Class I railroads.

Recent tests on one of the Class I roads showed that the life of the processed liners was increased approximately 85,000 miles beyond normal service.

For the convenience of industry and users, nation-wide processing plants have been established in the following cities: Newark, Detroit, Ravenna and Dayton, Ohio, Chicago, St. Louis, Minneapolis, Colorado Springs, San Diego, Seattle and Los Angeles.

◆

High Temperature Aluminum Paint

An aluminum paint which the manufacturer claims will withstand extreme heat as high as 1,200 deg. F. has been an-

(*Continued on page 120*)

NEWS

N.Y. RR Club Announces Essay Contest Winners

THE New York Railroad Club has announced the winners in its 1951 Roy V. Wright Memorial Essay Contest as follows:

The $500 award to W. J. Cavanagh, a member of the traffic department of the United States Steel Export Company, New York.

Awards of $100 each to: Robert L. Banks, transportation consultant, National Military Establishment, Hyattsville, Md.; Raymond E. Hannon, research assistant, Canadian Pacific, Montreal; Charles Harwood, Jr., research economist, New Rochelle, N. Y.; Paul K. Lambert, traffic department, General Refractories Company, Philadelphia; Robert A. Patterson, traffic representative, Long Island Rail Road, East Williston, N. Y.; Stuart W. Rider, Jr., assistant solicitor, Chicago, Milwaukee, St. Paul & Pacific, Minneapolis; R. E. Rose, assistant chief rate clerk, passenger traffic department, Canadian National, Winnipeg; Francis P. Ryan, traffic department, Eastman Kodak Company, Rochester, N. Y.; E. H. Spencer, assistant supervisor of traffic, Fairless Works, U. S. Steel Company, Morrisville, Pa.; and Dr. G. Lloyd Wilson, professor of transportation, Wharton School, University of Pennsylvania, Philadelphia.

Mr. Cavanagh and six of the $100 prize winners (Messrs. Banks, Harwood, Lambert, Rider, Ryan and Dr. Wilson) wrote on the assigned subject—"Essential Provisions of an Adequate National Transportation Policy." The essays submitted by Mr. Patterson, Mr. Rose and Mr. Hannon were based on the theme "How to Make Passenger Traffic Pay." Mr. Spencer's subject was "Agreed Rates."

A.A.R. Turns Down Unicel Car—Temporarily

THE Mechanical Division of the Association of American Railroads has—temporarily at least—not approved the Pressed Steel Car Company's Unicel combination refrigerator-box car of cellular laminated wooden construction.

The car was the major subject of a meeting of the division's General Committee which, in a resolution, considered the car "a step backward primarily because of experience with wood cars in the past" and because of the difference in maintenance methods—and maintenance expense—it would entail. The committee pointed out that: "Woodworking machinery on all railroads has been practically eliminated or so severely curtailed that maintenance of wood cars would introduce added capital expenditures."

The committee agreed that the car, in new condition, had more than adequate strength. But it questioned that the car would retain that strength over a full period of service life. That, the committee felt, was something to which only time would reveal the answer.

The committee's action, however, does not restrict railroads from buying the car for use on their own lines.

John I. Snyder, Jr., president of the Pressed Steel Car Company, announced on April 10 that it was the company's aim to prove "Unicel" to the satisfaction of all potential users for unrestricted interchange service on the nation's railroads.

Mr. Snyder disclosed that while the A.A.R. had no objections to individual railroads using the "Unicel" on their own lines, the association had recommended that "no cars of this type be built for interchange service except in the event of a national emergency which would restrict steel in freight car building . . . because maintenance of such cars would necessitate additional capital expenditures."

Stressing Unicel's steel-saving advan-

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

Item No.		Month of December		12 months ended with December	
		1951	1950	1951	1950
FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)					
3	Road locomotive miles (000) (M-211):				
3-05	Total, steam	20,994	28,693	295,426	346,515
3-06	Total, Diesel-electric	24,809	20,025	273,807	211,799
3-07	Total, electric	760	793	9,695	9,880
3-04	Total, locomotive-miles	46,563	49,511	578,950	568,260
4	Car-miles (000,000) (M-211):				
4-03	Loaded, total	1,584	1,709	20,601	19,633
4-06	Empty, total	881	812	10,602	10,139
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01	Total in coal-burning steam locomotive trains	36,248	47,097	519,089	577,555
6-02	Total in oil-burning steam locomotive trains	8,850	12,370	139,728	154,174
6-03	Total in Diesel-electric locomotive trains	66,202	55,102	762,500	598,910
6-04	Total in electric locomotive trains	2,023	2,122	26,451	26,351
6-06	Total in all trains	113,331	116,697	1,447,914	1,357,302
10	Averages per train-mile (excluding light trains) (M-211):				
10-01	Locomotive-miles (principal and helper)	1.04	1.05	1.04	1.05
10-02	Loaded freight car-miles	37.70	38.60	39.50	38.60
10-03	Empty freight car-miles	20.90	18.30	20.30	19.90
10-04	Total freight car-miles (excluding caboose)	58.60	56.90	59.80	58.50
10-05	Gross ton-miles (excluding locomotive and tender)	2,693	2,634	2,774	2,669
10-06	Net ton-miles	1,251	1,233	1,301	1,224
12	Net ton-miles per loaded car-mile (M-211)	33.20	32.00	33.00	31.70
13	Car-mile ratios (M-211):				
13-03	Per cent loaded of total freight car-miles	64.30	67.80	66.00	65.90
14	Averages per train hour (M-211):				
14-01	Train miles	17.10	16.60	17.00	16.80
14-02	Gross ton-miles (excluding locomotive and tender)	45,525	43,139	46,424	44,352
14	Car-miles per freight car day (M-240):				
14-01	Serviceable	42.70	44.40	46.00	45.20
14-02	All	40.70	42.30	43.80	42.50
15	Average net ton-miles per freight car-day (M-240)	871	915	954	888
17	Per cent of home cars of total freight cars on the line (M-240)	40.80	35.90	37.50	40.80
PASSENGER SERVICE (DATA FROM I.C.C. M-213)					
3	Road motive-power miles (000):				
3-05	Steam	9,935	13,139	119,382	141,521
3-06	Diesel-electric	17,989	15,948	198,101	176,722
3-07	Electric	1,782	1,780	19,548	19,385
3-04	Total	29,706	30,867	337,031	337,629
4	Passenger-train car-miles (000):				
4-08	Total in all locomotive-propelled trains	295,305	302,159	3,293,157	3,257,835
4-09	Total in coal-burning steam locomotive trains	54,382	74,086	629,385	740,281
4-10	Total in oil-burning steam locomotive trains	33,005	39,271	388,031	442,711
4-11	Total in Diesel-electric locomotive trains	188,657	170,209	2,065,563	1,866,810
12	Total car-miles per train-miles	9.87	9.71	9.61	9.47
YARD SERVICE (DATA FROM I.C.C. M-215)					
1	Freight yard switching locomotive-hours (000):				
1-01	Steam, coal-burning	1,025	1,436	14,179	17,101
1-02	Steam, oil-burning	192	266	2,796	3,023
1-03	Diesel-electric[1]	3,180	2,850	35,736	30,441
1-06	Total	4,421	4,580	53,015*	50,894
2	Passenger yard switching hours (000):				
2-01	Steam, coal-burning	44	67	540	701
2-02	Steam, oil-burning	13	15	156	164
2-03	Diesel-electric[1]	280	262	2,945	2,776
2-06	Total	373	381	4,045	4,054
3	Hours per yard locomotive-day:				
3-01	Steam	7.30	8.50	7.80	8.10
3-02	Diesel-electric	17.10	17.90	17.20	17.50
3-05	Serviceable	14.40	14.70	14.40	14.20
3-06	All locomotives (serviceable, unserviceable and stored)	12.50	12.70	12.40	12.10
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.92	1.84	1.78	1.79
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	0.78	0.78	0.76	0.77

[1] Excludes B and trailing A units.

tages of "between 11 to 20 tons per car," he emphasized that "the steel shortage has grown more acute since 'Unicel' was first proposed and our national steel emergency situation may be upon us sooner than most Americans think. Many authorities say it is here now.

"Until sufficient new steel-making facilities begin turning out the vast quantities of steel America now requires, we will continue to have a serious freight-car shortage weakening both the nation's transportation system, of which it is such a vital part, and our defense rearmament program. Steel alone won't answer the freight-car shortage. For car builders are simply not getting the necessary amounts of steel in proper balance. Besides, 'Unicel' cars can be built 20 per cent faster than conventional steel freight cars."

Pressed Steel Car will continue with development work in applying the "Unicel" material and principle to fields other than railroads, Mr. Snyder said, adding: "To date we have made Unicel truck trailers, shipping containers and houses."

Oil and Gas Power Conference

THE 24TH annual conference and exhibit of the Oil and Gas Power Division of the American Society of Mechanical Engineers will be held in the Statler Hotel, Buffalo, N. Y., June 23-27. Subjects for the technical sessions will include papers on engine lubrication, spark ignition gas engines, crankshaft design problems and diesel engine power plants. The latter session will embrace three subjects: diesel vs. steam power plants, the place of diesel engines in the R.E.A. program, and vapor phase cooling. There will also be a panel discussion on engines of high specific output, subdivided under design improvements in high output diesel engines both from the navy and industrial viewpoints; valves, pistons, piston inserts and piston rings, and a special view of the piston sealing problem.

The exhibit will represent a large number of engine manufacturers, accessories, plant equipment, and services. Time will also be available for the inspection of plants in uffalo and vicinity, including the Worthington Corporation, Niagara hydro plant, Van der Horst Corporation of America at Olean, and others.

Cleveland Car Supervisors Elect Officers

THE Cleveland Car Department Supervisors Association, which was organized in December 1950 to promote increased efficiency in railway car handling and holds meetings the second Wednesday of each month at the Belmont Hotel, Cleveland, has elected the following new officers for the fiscal year: president, A. C. Bender, joint supervisor car inspectors, all lines, Cleveland; first vice-president, E. J. Zepp, general car foreman, Nickel Plate, Cleveland; second vice-president, J. J. Matchulat, foreman car repairs, Pennsylvania, Cleveland; secretary, N. F. Lorenz, car foreman, Nickel Plate, Cleveland; treasurer, J. C. Novy, car foreman, Erie, Cleveland.

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE APRIL ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road	*No. of units*	*Horse-power*	*Service*	*Builder*
Atchison, Topeka & Santa Fe	60[1]	....	.....	Various builders
Bangor & Aroostook	4[2]	1,500	General purpose	Electro-Motive
Canadian National	4[3]	....	Work-train service	Canadian Loco.
Central of Georgia	6[4]	1,200	Switching	Electro-Motive
Chesapeake & Ohio	17[5]	1,500	Road switching	Electro-Motive
Chicago & North Western	2A[6]	2,250	Passenger	Electro-Motive
	4B[6]	1,500	Freight	Electro-Motive
	50[6]	1,500	Road switching	Electro-Motive
	5[6]	1,200	Switching	Electro-Motive
	1[6]	800	Switching	Electro-Motive
	8[6]	1,600	Road switching	Fairbanks, Morse
	4[6]	1,200	Switching	Fairbanks, Morse
	11[6]	1,600	Road switching	Alco-G. E.
	4[6]	1,200	Switching	Baldwin-Lima-Hamilton
	1[6]	1,600	Road switching	Baldwin-Lima-Hamilton
Georgia	1[7]	1,500	General purpose	Electro-Motive
Lehigh Valley	3[8]	800	Road and yard switching	Electro-Motive
Missouri-Kansas-Texas	5[9]	1,200	Switching	Baldwin-Lima-Hamilton
	4[9]	1,600	Road switching	Baldwin-Lima-Hamilton
	6[9]	1,500	Road switching	Electro-Motive
Reserve Mining Co.	2	800	Switching	Electro-Motive
Southern Pacific	188[10]	....	.....	Alco-G. E. Baldwin-Lima-Hamilton Electro-Motive Fairbanks, Morse
Wabash	8[11]	1,500	Freight	Electro-Motive
	5[11]	1,500	General purpose	Electro-Motive

DIESEL-ELECTRIC LOCOMOTIVE INQUIRIES

	No. of units	*Horse-power*	
Transportation Corps	8[12]	....	.....
	1[12]	....	.....

FREIGHT-CAR ORDERS

Road	*No. of cars*	*Type of car*	*Builder*
Gulf, Mobile & Ohio	200[13]	Pulpwood	Company shops
St. Louis Refrigerator Car Co.	200[14]	40-ton refrigerator	Pressed Steel Car
Southern	1,500	70-ton gondola	Pullman-Standard
	1,750	70-ton hoppers	American Car & Fdry.
Western Pacific	100[15]	70-ton gondola	Greenville Steel Car

PASSENGER-CAR ORDERS

Road	*No. of cars*	*Type of car*	*Builder*
Grand Trunk Western	5[16]	Couches	Pullman-Standard
Long Island	20[17]	M. U.	Pullman-Standard

[1] Details of order not disclosed. If allocations of materials—especially steel—will permit, the Santa Fe will spend a total of $73 million for new equipment and other improvements during 1952. Of this total about $53 million will go for new freight cars and diesel locomotives. A statement contained in the road's recently released annual report said that allocations may restrict the total expenditures to some amount between $65 million and $70 million and make it necessary to carry a part of this program over into 1953.

[2] Estimated cost, $650,000. Delivery scheduled for September.

[3] To be operated on a new 147-mile development line under construction in northern Manitoba. Because winter temperatures there drop to 60 deg. below zero, the diesels will be equipped with specially designed heaters for maintaining fuel oil in a liquid state and heating engine cabs and the circulating water systems. They will be fitted also with fuel filling pumps to take on fuel from barrels along the right-of-way.

[4] Each to cost an estimated $106,000.

[5] Each to cost $167,391. Delivery expected not later than March 1953.

[6] Five of the Electro-Motive 1,500-hp. road switching units and three of the Alco-G.E. 1,600-hp. road switching units are for the C. St.P. M. & O. Deliveries expected to begin in the second quarter of 1952 and to be completed during the fourth quarter.

[7] Estimated cost, $150,656. Delivery scheduled for August.

[8] To cost $95,000 each. Delivery scheduled for the last quarter of 1952.

[9] Deliveries expected to begin in May and be completed in September.

[10] A breakdown of the order and builders is not available.

[11] Delivery scheduled for September.

[12] Eight units to be 80-ton; one, 120-ton. Six, including the latter, are for the Navy and the other three for the Marine Corps.

[13] Approximate cost, $1,125.000.

[14] St. Louis Refrigerator has also ordered 100 sets of car parts for the same type of cars to be constructed in its own shops.

[15] To be equipped with roller bearings. Estimated cost, $761,000. Delivery expected in the fourth quarter of 1952.

[16] To cost $119,800 each. Delivery expected in September.

[17] These single-deck cars will cost approximately $2,200,000. "Under the contract with manufacturer," according to William Wyer, trustee for the Long Island, the road "can later increase the number of cars ordered and obtain the benefit of quantity price on the entire order, if studies now under way indicate that this is desirable." Mr. Wyer added, "These studies will either recommend purchase of additional new cars or extensive rehabilitation of existing equipment."

NOTES:

New York Central.—The N.Y.C. is undertaking a series of improvements to its streamline sleeping cars, according to Gustav Metzman, president. The improved cars will be used together to obtain maximum riding benefits. Work is under way in the road's own shops and in those of the Pullman-Standard Car Manufacturing Company, with the first complete improved trains expected to go into operation late this spring. Mr. Metzman said. The initial phase of the program involves changes to 76 cars. Among the many interior changes are a newly developed starter for fluorescent lights to insure instant response and redesign of room air-conditioning apparatus. Other changes are latest-type shock absorbers to cushion lateral and vertical action; improved swing hanger connection in combination with rubber coil springs of circular design to produce smoother lateral action; noise reduction by redesigning ends of cars and incorporating special rubber springs in coupler support arrangements. Mechanical changes include refinement of power generating squipment; devices to prevent wheels from sliding; and improved lubrication of journal roller bearings.

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THROTTLES
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THERMOSTATIC HEATER VALVES
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CONTROLLED RECIRCULATION STEAM GENERATORS FOR ALL SERVICES

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Complete steam generating units comprised of all types of boilers, fuel burning and related equipment for capacities from 1,000 to 1,000,000 or more lbs. of steam per hr.

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Units for recovery of chemicals and waste heat.

For process industries

Mills, pulverizers, air separators and flash drying systems for grinding, drying and separation. Incineration systems. Pressure vessels, columns, towers, tanks.

For municipalities

Flash drying and incineration systems for sewage sludge.

For homes

Automatic gas and electric water heaters. Range boilers. Soil pipe.

●

PROPERTIES

Affiliated Companies

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The Superheater Company, Ltd., London
The Superheater Company, Pty., Ltd., Sydney
Compagnie des Surchauffeurs, Paris
Compagnie des Echangeurs de Chaleur, S. A., Paris
Compagnie des Echangeurs de Chaleur, Vaduz, S. A., Liechtenstein
Combustion Engineering Corporation, Ltd., Montreal
Combustion Engineering de Mexico, S. A., Mexico, D. F.
Productos de Hierro y Acero, S. A., Mexico, D. F.
Ingenieria y Fuerza, S. A., Mexico, D. F.
Combustion Engineering Ltda., Rio de Janeiro
Combustion Publishing Company, Inc., New York
Stein et Roubaix, Paris
N. V. Carbo-Union Industrie Maatschappij, Rotterdam
Kohlenscheidungs-Gesellschaft, m.b.H., Stuttgart
Combustion Engineering-Superheater, Africa, (Pty.), Ltd., Johannesburg

Manufacturing Plants

U. S. A.—Chattanooga, Chicago, East Chicago, Monongahela, St. Louis
Canada—Sherbrooke, Quebec
Abroad (owned by affiliates)—Manchester, Eng.; Paris and Roubaix, France
Mexico—Tlalnepantla

C-E ELESCO

Announcement

●

THE BUSINESS OF THE

AMERICAN THROTTLE CO., INC.

HAS BEEN ACQUIRED BY

COMBUSTION ENGINEERING-SUPERHEATER, INC.

The Superheater Company has been closely associated with the American Throttle Company for many years and under this revised arrangement, the same personnel with whom you have been dealing on sales and service matters will continue at your service.

This company will continue all past activities of the American Throttle Company and inquiries or orders for complete throttles or parts will be given prompt attention.

THE SUPERHEATER COMPANY, INC.

Division of COMBUSTION ENGINEERING-SUPERHEATER, INC.
200 MADISON AVENUE, NEW YORK
BANKERS BUILDING, CHICAGO

Mechanical Division Meeting at Frisco June 24-26

The Terrace Ball Room of the Fairmount Hotel, San Francisco, has been chosen for the sessions of the A.A.R. Mechanical Division convention to be held June 24, 25, and 26. Presentation of committee reports will be limited to a brief summary of their principal features. It is hoped, however, that the representatives of the railroads, car and locomotive builders, supply companies, etc., planning to attend will review the reports carefully in advance and be prepared with memoranda for a thorough discussion of each.

The program for each of the three days is as follows. The time given is California Daylight Saving Time.

TUESDAY, JUNE 24
10 A. M.

- Address by D. J. Russell, president, Southern Pacific
- Address by W. J. Patterson, member, Interstate Commerce Commission
- Address by B. M. Brown (chairman), general superintendent motive power, Southern Pacific
- Action on Minutes of 1951 annual meeting
- Appointment of Committees on Subjects, Resolutions, etc.
- Unfinished business
- New business
- Report of General Committee
- Report of Nominating Committee
- Discussion of reports on:
  - Locomotive Construction:
    - Steam and Electric Locomotives Section
    - Diesel Locomotive Section
    - Gas-Turbine Locomotive Section
  - Axle and Crank-Pin Research
  - Safety Appliances
  - Passenger-Car Specifications

WEDNESDAY, JUNE 25
9:30 A. M.

- Address by E. H. Davidson, director, Bureau of Locomotive Inspection, I.C.C.
- Address by L. L. Adams, manager—transportation planning, United States Steel Corporation
- Discussion of reports on:
  - Brakes and Brake Equipment
  - Geared Hand Brakes
  - Loading Rules
  - Forest Products Loading (Special Committee)
  - Specifications for Materials
  - Couplers and Draft Gears
  - Arbitration
  - Prices for Labor and Materials
  - Lubrication of Cars and Locomotives
  - Development of Hot-Box Alarm Devices

THURSDAY, JUNE 26
9:30 A. M.

- Discussion of reports on:
  - Tank Cars
  - Wheels
  - Car Construction
- Election of members of General Committee and Committee on Nominations
- Report of Committee on Resolutions

SUMMARY OF MONTHLY HOT BOX REPORTS

Month	Foreign system and freight car Mileage (total)	Cars set off between division terminals account hot boxes			Miles per hot box car set off between division terminals
		System	Foreign	Total	
July, 1950	2,745,932,894	——	——	23,957	114,619
August, 1950	2,937,455,820	7,422	15,490	22,912	128,206
September, 1950	2,974,297,739	6,541	12,881	19,422	153,141
October, 1950	3,165,997,915	4,343	8,935	13,278	238,439
November, 1950	2,868,871,913	2,536	5,331	7,867	364,672
December, 1950	2,813,042,212	2,278	5,968	8,246	341,140
January, 1951	2,840,847,511	2,870	8,436	11,306	251,269
February, 1951	2,425,226,454	4,528	14,063	18,591	130,452
March, 1951	3,063,173,942	3,667	10,078	13,745	222,857
April, 1951	2,996,562,763	3,702	8,914	12,616	237,521
May, 1951	3,013,634,782	5,631	13,737	19,368	155,599
June, 1951	2,874,873,495	7,074	15,376	22,450	128,057
July, 1951	2,768,920,095	8,886	18,823	27,709	99,929
August, 1951	3,009,371,111	9,023	19,092	28,115	107,038
September, 1951	2,925,570,545	6,472	13,565	20,037	146,008
October, 1951	3,116,490,095	4,131	9,053	13,184	236,384
November, 1951	2,939,503,144	2,022	4,405	6,427	457,368
December, 1951	2,752,316,133	2,130	5,398	7,528	365,611

J. D. Conway Dies

JOHN D. CONWAY, secretary of the Railway Club of Pittsburgh and secretary-treasurer of the Railway Supply Manufacturers' Association, died on March 31. Mr. Conway was 88 years old. He entered railway service in 1881 as a telegraph operator for the Cleveland & Pittsburgh (now a part of the Pennsylvania) and was subsequently engaged as a telegraph operator for the

J. D. Conway

Pittsburgh & Lake Erie, and as clerk and chief clerk, motive power department, of the P. & L. E. He became secretary-treasurer of the Railway Club of Pittsburgh upon its organization in 1901 and secretary in 1918. In 1910 he was appointed secretary-treasurer of the Railway Supply Manufacturers Association, and served as chairman of the Pittsburgh Section from 1920 to 1927.

Nickel Conservation Research

CONSERVATION of vitally needed nickel and chromium in heat-resistant castings is the objective of a research project announced by the Alloy Casting Institute of Mineola, N. Y. From knowledge of the iron-chromium-nickel alloy system and field experience, casting metallurgists selected an alloy containing 21 per cent chromium and 9 per cent nickel, designated as the HF type, as the material most likely to provide the combination of strength and corrosion resistance required for "intermediate-temperature" (900-1,400 deg. F.) service. Tests to date indicate that this alloy offers a promising solution to the requirements of such service.

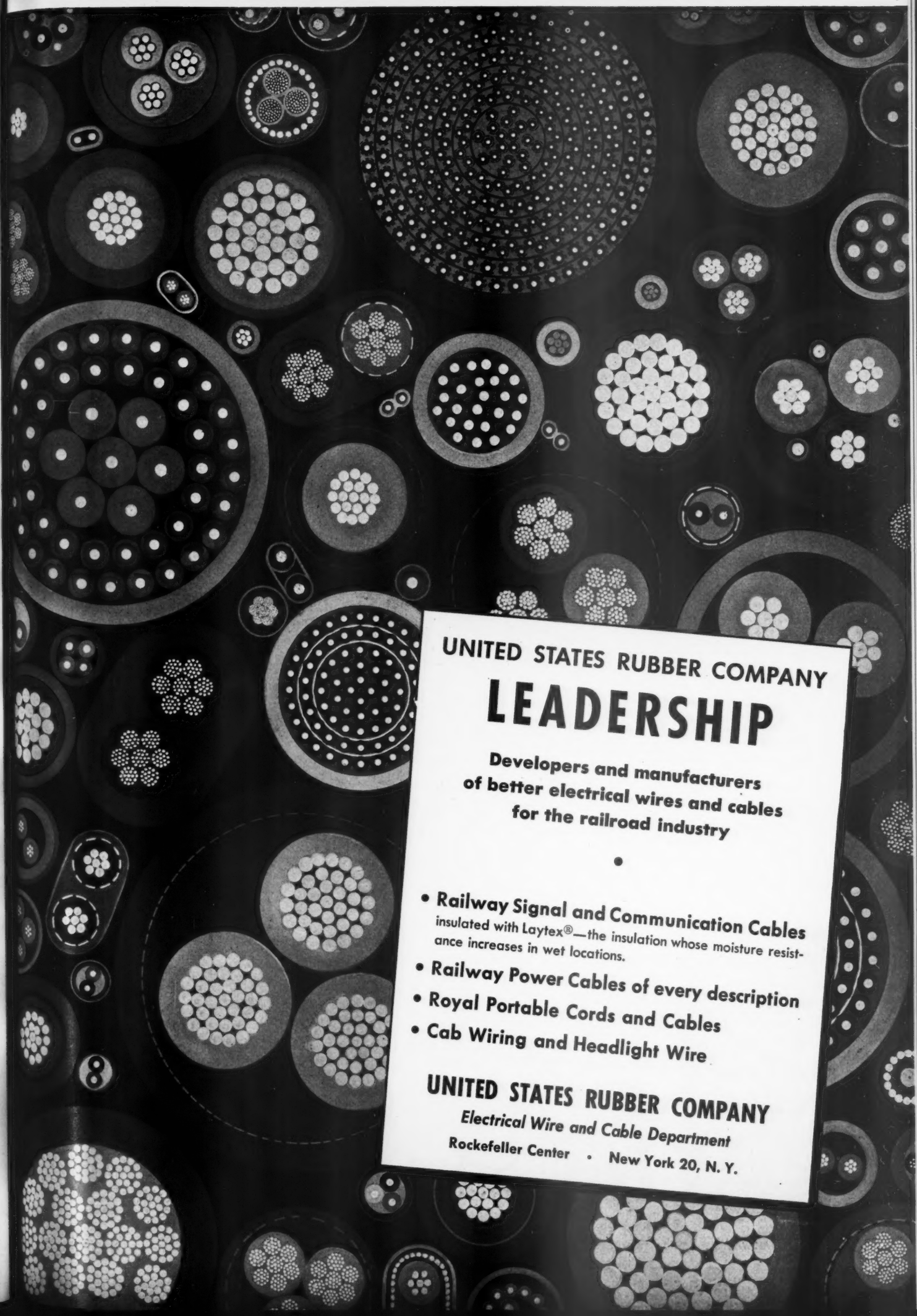
The team at the Battelle Memorial Institute where this research has been concentrated is now investigating a series of fourteen compositions within the HF alloy specification range to determine which compositions will offer optimum mechanical properties at elevated temperatures.

Wrought stainless steels containing about 18 per cent chromium and 8 per cent nickel have considerably less high-temperature strength than the cast alloys of the 25 per cent chromium-12 per cent nickel and the 35 per cent nickel-15 per cent chromium types. However, this is not true in cast alloys. Tests now being made indicate the cast HF material to have strength properties comparable to higher alloyed cast grades at these intermediate temperatures. This situation points up the necessity for using the A.C.I. alloy designations in ordering castings, rather than the A.I.S.I. type numbers (302, 304, etc.) which are associated with wrought materials only.

Steel Founders' Society Confers Honor Awards

NATIONAL medal awards for outstanding leadership in the steel casting industry were awarded by the Steel Founders' Society of America at its fiftieth annual meeting held in Chicago recently.

James Suttie, vice-president of American Steel Foundries, received the Lorenz Memorial gold medal, the society's top award. The organization's Technical and Operating gold medal for 1951 was awarded to Luther A. Kleber, vice-president in charge of manufacturing of the General Steel Casting Corporation. Harold H. Johnson, chief metallurgist at the Sharon, Pa., plant of the National Malleable & Steel Castings Co., received the annual Steel Foundry Facts award for excellence of material published in the society's technical publication.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SUPPLY TRADE NOTES

W. H. MINER, INC.—*William E. Withall*, formerly assistant to president, W. H. Miner, Inc., Chicago, has been elected first vice-president.

Mr. Withall began his career with Miner in 1937 in its foundry and research laboratory. In 1941 he was transferred to the

W. E. Withall

sales department where he continued until 1942 when he enlisted in the United States Navy, serving as a lieutenant in ordnance through 1945. Upon his return to Miner in January 1946, Mr. Withall became assistant to president.

◆

PEERLESS MACHINE COMPANY.—*C. O. Wanvig, Jr.*, formerly secretary of the Peerless Machine Company, Racine, Wis., has been elected president of the company, succeeding the late *J. R. McDonald*.

◆

MONTREAL LOCOMOTIVE WORKS.—*Herbert J. Purcell* has been appointed material procurement manager for the Montreal Locomotive Works, Ltd. Mr. Purcell, who has been with the company since 1942, will be in charge of purchasing, stores, and expediting of materials.

PITTSBURGH PLATE GLASS COMPANY.—*G. Donald Campbell* has been appointed superintendent, and *John A. McMillan* plant engineer, for the recently purchased Shelbyville, Ind., manufacturing plant of the Pittsburgh Plate Glass Company. Conversion of the plant to fiber glass production will soon be underway.

◆

F. E. SCHUNDLER COMPANY.—*Earl W. Rosa*, has been appointed sales manager of the F. E. Schundler Company, Joliet,

Earl W. Rosa

Ill. Mr. Rosa, who has been with the company for 11 years, will direct sales of Perlite, Vermiculite and insulating blocks and cements.

◆

INDEPENDENT PNEUMATIC TOOL COMPANY.—*Arthur H. Nelson*, service engineer for the Independent Pneumatic Tool Company of Chicago, has been appointed manager of electric tool sales at the Chicago branch.

◆

WORTHINGTON CORPORATION.—At a recent stockholders meeting of the *Worthington Pump & Machinery Corp.* it was voted to change the company name to Worthington Corporation. H. C. Ramsey, president, said no corporation policies or practices will be affected in any way by the name change, which has been brought about because "Worthington has extended its manufacturing activities into many other fields with the result that today, with few exceptions, every industrial and commercial enterprise is a potential user of one or more of the many other items of our equipment."

◆

STANDARD RAILWAY EQUIPMENT MANUFACTURING COMPANY.—*George N. Goad* has been elected vice-president of the Standard Railway Equipment Manufacturing Company's Canadian subsidiary, with headquar-

G. N. Goad

ters in Montreal. Mr. Goad worked for Canadian railroads for 40 years, and was chief of car service for the Canadian National before joining Standard Railway in 1939.

◆

SPRING PACKING CORPORATION—*John B. Welch* has been elected vice-president in charge of the Industrial Division of Spring Packing. Mr. Welch formerly assistant vice-president, now directs Spring Packing activities in pressure-sensitive industrial joint sealants and Spring-Kote spray-on protective coatings for metals and masonry. He will make his headquarters at the Chicago general offices.

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IT'S NEW! CHEK-SPEK
HERE'S TURCO'S NEW PRODUCTION-LINE METHOD OF FLAW LOCATION...SIMPLE, SAFE & ACCURATE. SAVES YOU MONEY & TIME!
DEVELOPED FROM TURCO'S FLEXIBLE DY-CHEK PROCESS. ACCEPTED BY THE AIR FORCE... COVERED BY NAVY ASO NUMBER, R40-K-100.
CHIEF INSPECTORS REPORT
KEEPS ACCEPTABLE PARTS MOVING...ONLY SUSPECTED PARTS GO TO TRAINED INSPECTORS. SIMPLIFIES EVALUATION, CUTS DEPARTMENT COSTS.
CUSTOMER SERVICE DEPARTMENTS KNOW
DY-CHEK PORTABILITY GIVES YOU ON-THE-SPOT INSPECTIONS. LESS GROUND TIME—MORE FLYING HOURS.

O. F. Brookmeyer

R. M. Dilworth

Walter N. Fritts

GENERAL MOTORS APPOINTMENTS

Two members of the *Electromotive Division* of General Motors, have been assigned to look into "post-diesel application of E.-M.D.'s skills and facilities" from the standpoints of engineering and commercial availability. *O. F. Brookmeyer*, former general sales manager, and *R. M. Dilworth*, former chief engineer, will "study ways in which engineering and manufacturing techniques and facilities accumulated in the development of the diesel locomotive may be applied in the development of other products beneficial to American railroads." Mr. Dilworth—who for the past few years has headed the advanced engineering activity of E.-M.D.—is to explore the engineering aspects, and Mr. Brookmeyer the commercial availability aspects.

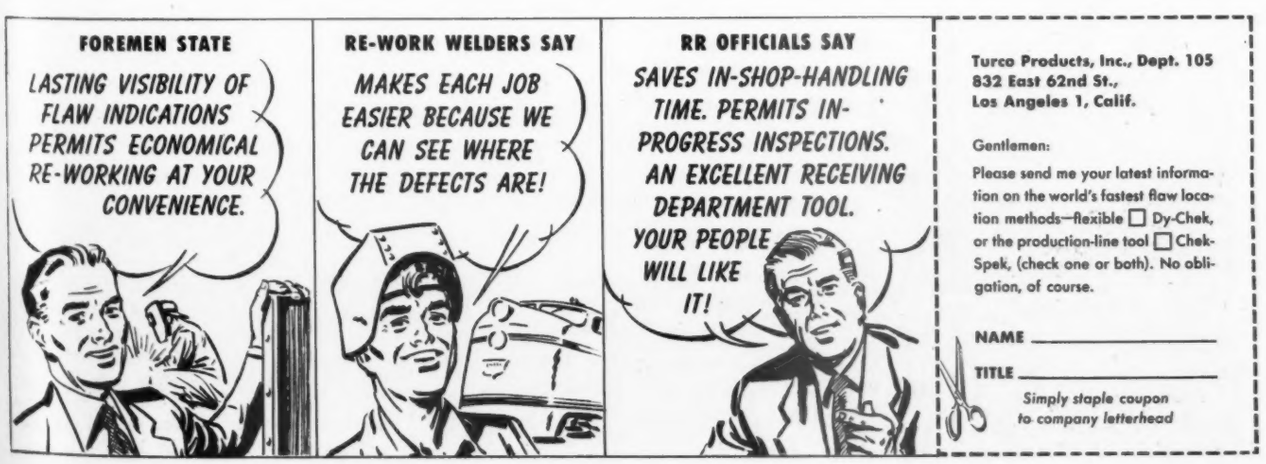
Nelson C. Dezendorf, general manager of Electro-Motive and vice-president of the parent General Motors Corporation, in announcing the new program, made it clear that these future developments would not be put in operation until railroad dieselization demand will permit a reduction in current high locomotive manufacture. "It will be several years," he said, "before railroad demand for diesel locomotives is satisfied to the point that any major portion of our manpower and facilities would be diverted to other activities."

G. M. La Riviere

R. L. Terrell

Walter N. Fritts, assistant general sales manager of the *Electro-Motive Division* of General Motors Corporation, has been appointed general sales manager, succeeding *O. F. Brookmeyer*, who has been placed on special assignment. The Eastern region, formerly headed by *Paul R. Turner*, now director of sales, has been divided into two new regions. One, still known as the Eastern region, will be at New York, and will be headed by *G. M. LaRiviere*, who is transferred from the post of manager of the St. Louis region. The other, with headquarters at Washington, D. C., will be known as the Southeastern region. *R. L. Terrell*, former assistant manager of the Eastern region, will be its manager. *Frederick W. Walker*, district sales manager, Chicago region, has been named manager, St. Louis region. *George W. Rukgaber*, sales manager, east central district, Chicago region, has been appointed sales manager, western district, at Chicago, and is succeeded by *Floyd E. Von Ohlen*, sales representative, Chicago region.

Mr. Brookmeyer before joining Electro-Motive in 1925, spent 20 years with the Cleveland, Cincinnati, Chicago & St. Louis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LASTING VISIBILITY OF FLAW INDICATIONS PERMITS ECONOMICAL RE-WORKING AT YOUR CONVENIENCE.
RE-WORK WELDERS SAY
MAKES EACH JOB EASIER BECAUSE WE CAN SEE WHERE THE DEFECTS ARE!
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SAVES IN-SHOP-HANDLING TIME. PERMITS IN-PROGRESS INSPECTIONS. AN EXCELLENT RECEIVING DEPARTMENT TOOL. YOUR PEOPLE WILL LIKE IT!
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Please send me your latest information on the world's fastest flaw location methods—flexible ☐ Dy-Chek, or the production-line tool ☐ Chek-Spek, (check one or both). No obligation, of course.
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Lord Shear-Type Flexible Couplings deliver the smoothest power because of the torsional softness of elastic materials stressed in shear. This softness cushions the shocks of starting and stopping . . . it prevents the transfer of shock loads to bearings and gears . . . places natural frequencies beyond operating speed ranges . . . acts as a mechanical fuse to disconnect equipment under overload or stall conditions.

Lord Shear-Type Flexible Couplings are engineered specifically for the work they must do . . . they prolong the service life of driven equipment . . . operate quietly . . . need no lubrication . . . prevent transmittance of noise between shafts . . . cannot be damaged by dust, dirt, abrasives.

For smooth, noiseless, uniform drive, there is a Lord Flexible Coupling from 1/50 to 100 hp. @ 1750 r.p.m. that will pay you a handsome profit.

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Michigan 8871

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520 N. Michigan Ave.
Michigan 2-6010

NEW YORK 16, NEW YORK
280 Madison Avenue
MUrray Hill 5-4477

DALLAS, TEXAS
1613 Tower Petroleum Building
PRospect 7996

ERIE, PENNSYLVANIA
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2-2296

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HEADQUARTERS FOR
VIBRATION CONTROL MOUNTINGS
. . . BONDED RUBBER PARTS

Frederick W. Walker

Floyd E. Von Ohlen

(New York Central) ultimately resigning from the position of superintendent of transportation at Indianapolis. While with the railroad, he was active in application of gas-electric rail cars to Big Four service. With E.-M.D. he subsequently directed sale of rail cars prior to development of the diesel locomotive.. Continuing, he directed sales aspects of the introduction of the new motive power and carried it from virtual infancy to its present state as a fully accepted type of equipment.

Mr. Dilworth joined Electro-Motive in 1926 after having experience in the construction of gas-electric rail cars with General Electric. During World War I he served the U. S. Army Engineer Corps as senior civilian engineer and was in charge of the Manila and Subig Bay district in the Philippines. On April 5, 1948, he became engineering assistant to the vice-president of E.-M.D., and in that capacity has been in charge of Electro-Motive's advanced engineering projects that fall outside the scope of normal engineering activities.

Mr. Fritts began work at Electro-Motive in 1935 as a draftsman. Three years later, he was promoted to junior engineer and six months later became an assistant engineer. In 1943, he was appointed assistant section manager. In 1945, he transferred to the sales depatment as sales engineer and in November of that year became manager of the newly-formed sales engineering section. He was named assistant general sales manager in 1949.

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No Guess Work

Here's Our Proposition

• If you are interested in maximum safety in handling the 101 odd loads that your crane moves daily—

The DUALOC Ending produces the strongest wire rope sling made. Two collars insure uniform strength from sling to sling. Actual strength certified by warranty certificate. Preformed Improved Plow Steel Green Strand Wire Rope with Steel Core provides maximum strength and resistance to kinking.

Popular sizes and types in stock for immediate delivery.

*Trade Mark Registered

ACCO Registered Wire Rope Slings

ACCO TRADE MARK

WIRE ROPE SLING DEPARTMENT
AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

For oily, greasy dirt

USE THE SPRAY ON LET SOAK RINSE OFF METHOD!

You can eliminate at least 90% of the manual labor, along with the mess and trouble required to clean away oily, greasy dirt, by using Super Magnusol. This concentrated cleaner is used mixed with safety solvent or kerosene. The resulting cleaning solution takes the "cling" out of oil and grease. You simply spray it on the surfaces to be cleaned, let it soak in a few minutes, then rinse away with steam or water.

DO A REAL CLEANING JOB AND USE LESS LABOR

Super Magnusol gives you far superior cleaning to what you can get by manual methods, and leaves no oily film. It's safe for all metals and good paint...the solution is non-flammable, and you get no unpleasant fumes.

USE IT ON THESE JOBS

Diesel Engine Rooms
Save up to $12 per cleaning.

Engine Pits
Do a thorough job in half the time.

Engine Trucks and Underbodies
Cleaned in minutes instead of hours!

Concrete Floors
Removes all oil and grease . . . even deposits of very long standing.

TRY IT OUT!

Order a small drum of Super Magnusol and try it out on some of these jobs! You'll see why it is being used in more and more railroad shops!

Railroad Division

MAGNUS CHEMICAL COMPANY • **77 South Ave., Garwood, N. J.**

In Canada—Magnus Chemicals, Ltd., Montreal

MAGNUS CLEANERS AND CLEANING EQUIPMENT

Representatives in all principal cities

Mr. LaRiviere, who has been regional manager at St. Louis since 1947, joined E.-M.D. as district sales manager at Washington in 1944. Before coming to Electro-Motive he had served for 21 years with the Atlantic Coast Line and the Canadian National in various traffic department capacities.

Mr. Terrell, who has been assistant regional manager of the New York (Eastern) region since April 1950, joined General Motors Research Laboratory at Detroit as an apprentice in 1936. He later served a year and a half as an engine mechanic in the Army Air Forces. He then returned to General Motors Research. In 1939 he joined Electro-Motive as a service engineer and before entering the Navy in 1942 was an installation engineer. He returned to E.-M.D. in 1945 and was appointed district sales manager at Washington in 1946 and general parts manager in 1948.

Mr. Walker, a graduate of Lehigh University, where he received a B.S. degree in industrial engineering, served as an instructor in machine design at the University in 1936-37. He joined Electro-Motive in June 1937 as an apprentice became application engineer in 1945, manager of statistics and market analysis in 1946, and district sales manager in the Chicago region in 1949.

Mr. Von Ohlen, who was a sales representative for the Chicago region from March 1951 until his recent promotion, joined Electro-Motive in 1942 as a tester in the engine division. In 1944 he was transferred to the service department as an instructor, in 1946 assistant manager of the new locomotive section, in July 1942 became manager of this section, and in 1950 sales engineer, which position he held until his appointment as district sales representative for the Chicago region.

◆

F. W. Evinger

LEHON COMPANY.—*Fred W. Evinger* has joined the Lehon Company at Chicago as sales representative. He had been with the Patterson Sargent Company since 1944.

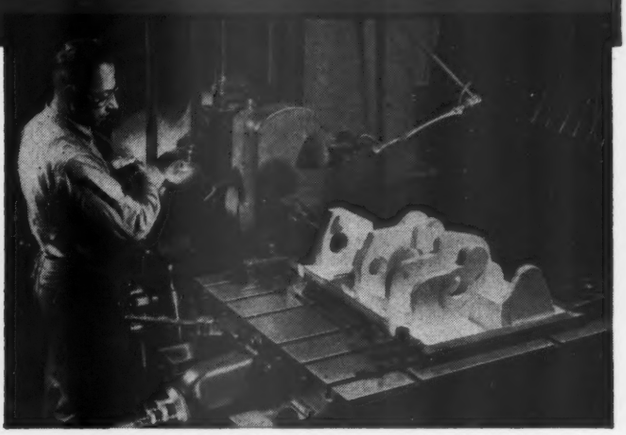
◆

CORNING GLASS WORK.—*Charles L. Day*, formerly eastern sales district manager for the technical products division of the Corning Glass Works, has been appointed manager of the new sales district office recently opened in Washington, D. C. Mr.

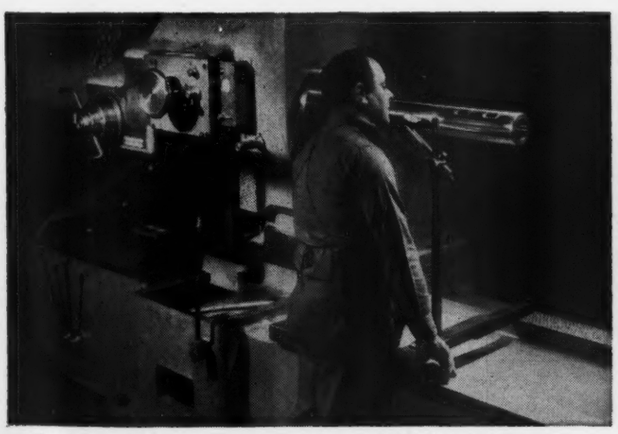
52 YEARS OF SPECIALIZATION

PAY DIVIDENDS IN THE DEFENSE EFFORT

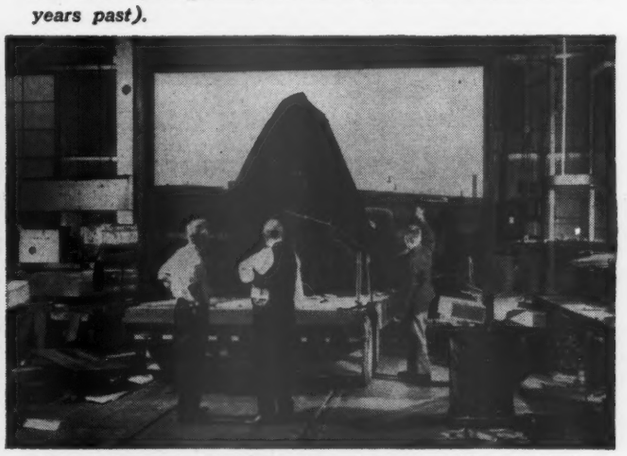
Our plant is operating at peak capacity producing horizontal Boring machines, NOTHING ELSE.



In addition, many outside suppliers are helping us around the clock (using many a Lucas purchased from us in years past).

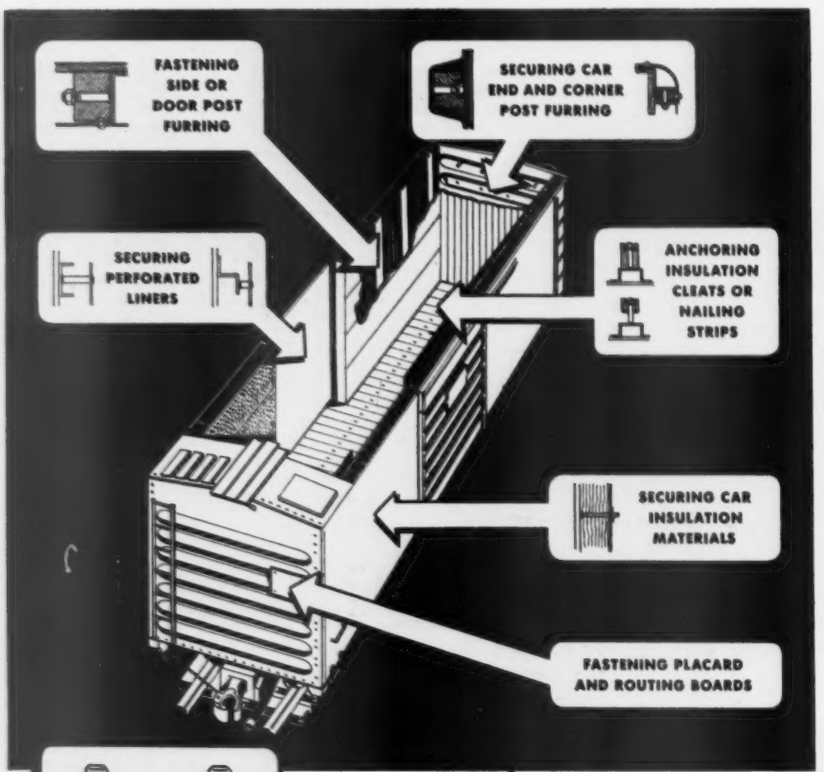


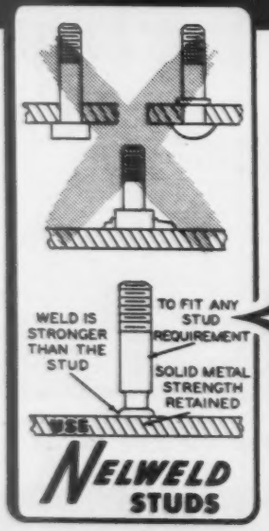
Because of half a century of specialization Lucas men maintain high Lucas standards despite vastly increased output.



More shipments than ever, but, of course, defense priorities dictate who gets what. Perhaps this is the machine we originally scheduled for you.

Cut fastening costs on CAR BUILDING AND REPAIR with NELWELD


FASTENING SIDE OR DOOR POST FURRING
SECURING CAR END AND CORNER POST FURRING
SECURING PERFORATED LINERS
ANCHORING INSULATION CLEATS OR NAILING STRIPS
SECURING CAR INSULATION MATERIALS
FASTENING PLACARD AND ROUTING BOARDS



GET THESE ADVANTAGES WITH NELWELD STUDS:

REDUCES MATERIAL HANDLING by taking the tool to the job

INSURES WATERTIGHT FASTENINGS no holes for moisture penetration — smooth exterior surfaces

INCREASES MEMBER STRENGTH by eliminating punched holes

INCREASES PRODUCTION SPEEDS by eliminating drilling and reaming, punching, stud-riveting or hand welding

REDUCES MAINTENANCE COSTS ... no bolts or rivets to work loose

Full information and Nelweld Engineering Service are available to show you how these advantages can bring cost-saving results to your fastening operations. Contact your nearest Nelson representative or Dept. R-3, Lorain, Ohio.

Faster it Better ... at Less Cost, with NELWELD

NELSON STUD WELDING

DIVISION OF GREGORY INDUSTRIES, INC., LORAIN, OHIO

Day will act in a liaison capacity between Corning research, engineering and manufacturing groups and various agencies and departments of the federal government.

◆

GRAYBAR ELECTRIC COMPANY.— *W. E. Henges* has been elected president of the Graybar Electric Company, to succeed *A. H. Nicoll*. Mr. Nicoll, who formerly was both president and chairman of the board, will continue as chairman. Mr. Henges joined

W. E. Henges

Graybar in 1913 at St. Louis. In 1942 he was appoined district manager there and two years later was transferred to Cleveland as district manager. He was elected a director of the company in 1949; vice-president in 1950, and early last year was elected a member of the executive committee.

◆

PATTERSON SARGENT.—*Don R. Myers* has been appointed Chicago representative of Patterson Sargent succeeding F. W. Evinger, resigned.

◆

GENERAL STEEL CASTINGS CORPORATION.—*Winthrop B. Reed* has been appointed district manager—miscellaneous sales of the General Steel Castings Corporation at Eddystone, Pa.

Mr. Reed began his career as assistant foreman in the inspection department of

Winthrop B. Reed

General Steel at Eddystone in 1946 after several years service with the army. In 1947 he became sales representative in the miscellaneous sales department and

later was appointed sales engineer for the company's eastern district sales offices. Since 1950, he has been arranging with the Ordnance Corps for supply and facilities contracts in connection with the company's production of armor steel castings.

◆

SAFETY CAR HEATING & LIGHTING CO.—*John F. Runge* has been appointed manager of the railroad sales division, New York

J. F. Runge

C. E. Hughes

K. T. Benninger

district, of the Safety Car Heating & Lighting Co., at New York; *Charles E. Hughes* has been appointed manager of the railroad sales division, New England district, in New Haven, Conn.; *K. T. Benninger* has been appointed sales representative, with headquarters in the Chicago district office.

◆

COMBUSTION ENGINEERING-SUPERHEATER, INC.—*Bard Browne*, vice-president of Combustion Engineering-Superheater, Inc., has retired. *Francis J. Dolan*, general manager of the Superheater Company division, succeeds Mr. Browne.

Mr. Browne has been a vice-president of the company since the merger of the Combustion and Superheater organizations several years ago. Prior to then he was a vice-president of the Superheater Company and was in charge of sales and service for that company and also the American Throttle Company. He continued to exercise these responsibilities as a vice-president of Combustion Engineering-Superheater, Inc. Mr. Browne, who received his technical education at Drexel Institute and the Uni-

Bard Browne

versity of Pennsylvania, entered railroad service in Kansas City, Mo. Prior to entering the employ of the Superheater Company in 1915, he was associated with railroads and locomotive builders both in domestic and foreign service. Mr. Browne plans to remain active in the railway supply business.

Francis J. Dolan

Mr. Dolan began his career with the Baltimore & Ohio (Staten Island Rapid Transit), where he worked successively in the stores, motive-power and floating-equip-

(*Continued on p. 110*)

THE LARGEST CRANKSHAFT GRINDING MACHINE IN THE WORLD USED IN AN INDEPENDENT REPAIR SHOP

CRANKSHAFT GRINDING SERVICE

Established 1924 . . . 27 years experience grinding crankshafts! The most complete engine rebuilding shop in the Southwest!

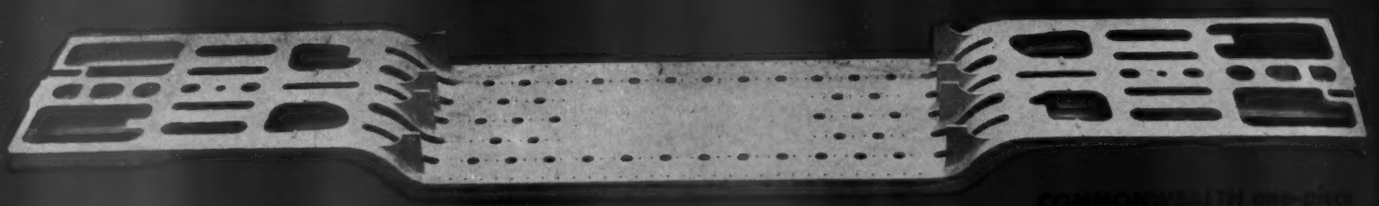
★ HARD CHROMIUM PLATING SERVICE
★ IRON PLATING SERVICE
★ MAGNAFLUX SERVICE

Four machines giving range from the smallest up to crankshafts with stroke of 16" and 200" O.A.L. Complete grinding service for locomotive, stationary, marine, automotive and compressor crankshafts. Damaged journals restored to size by iron plating and hard chromium finish plating.

NATIONAL WELDING & GRINDING CO. 2929 CANTON ST. DALLAS 1, TEXAS

More and More

Special Service Freight Cars



COMMONWEALTH one-piece underframe for 125-ton 58'6" long depressed center car.

Pictured above are two of the [illegible] Navy destroyers [illegible] Bay Area Rapid Transit cars, pilot cars and [illegible] other equipment for U. S. Navy destroyers.

GI[illegible]

COMMONWEALTH

CAST STEEL UNDERFRAMES AND TRUCKS

Are Transporting Heavy Loads

COMMONWEALTH one-piece cast steel underframes and 6-wheel trucks of proven design are being used on more and more heavy duty freight cars, assuring high availability and low maintenance expense.

These underframes combine the important elements of great strength with minimum weight, extreme durability and simplicity. For flat cars, depressed center cars and pulpwood cars, the one-piece design makes possible a lower car height from rail to loading floor, permitting easier loading and higher loads. It also provides a uniform surface for floor application.

COMMONWEALTH 6-wheel equalized trucks for high capacity freight cars provide positive equalization and adequate spring capacity which are essential to efficient, safe, economical operation. The rugged one-piece truck frames with machined integral pedestals assure true alignment of wheels and axles.

For higher availability and true upkeep economy in flat cars, depressed center cars, pulpwood cars, sulphur-carrying cars, ore cars, well cars and others — build them with COMMONWEALTH one-piece underframes and trucks.

(*Continued from page 107*)

ment departments. He later became associated with the Delaware & Hudson, where he served in the comptroller's department. In 1920 he joined the Locomotive Superheater Company, predecessor of the Superheater Company, as office manager at New York. In 1933 he was appointed assistant secretary and assistant treasurer of the company and, in 1938, assistant to the vice-president in charge of sales and service of locomotive equipment.

◆

NATIONAL ELECTRIC PRODUCTS CORPORATION.—A new sales and service department has been announced by the National Electric Products Corporation, of Pittsburgh.

DIXIE CUP COMPANY—The Dixie Cup Company has started operations in its new one-story 100,000 sq. ft. plant at Anaheim, Calif. Production capacity in the company's main plant at Easton, Pa., is also being increased by the addition of a new unit. Sizeable additions have also been made to plants at Fort Smith, Ark., and Brampton, Ont.

◆

AMERICAN BRAKE SHOE COMPANY. — *Norman A. Matthews* has been appointed assistant chief metallurgist of American Brake Shoe Company's metallurgical research department at Mahwah, N. J. Mr. Matthews was formerly division metallurgist for the Electro-Alloys Division at Elyria, Ohio.

Mr. Matthews, who is a graduate of Massachusetts Institute of Technology, joined American Brake Shoe in 1946. He was a Lieutenant Colonel in the Army Ordnance Department in World War II, and served as the director of the ferrous metallurgical laboratory at the Watertown, Mass., arsenal.

American Brake Shoe has purchased the plant and property formerly owned by the Jumbo Steel Company in Azusa, Cal. The American Forge division of Brake Shoe will use the plant to start a west coast steel forging operation.

◆

OAKITE PRODUCTS, INC.—The offices of the Oakite organization have been moved to 19 Rector street, New York 6.

◆

DEVILBISS COMPANY.—*Henry M. Kidd* has been appointed vice-president and sales manager of the DeVilbiss spray-painting equipment division.

Mr. Kidd became associated with DeVilbiss in its sales training course over 18 years ago. After this indoctrination, he became a sales correspondent. He was appointed assistant sales manager in 1944 and, sales manager of the spray-painting equipment division in October 1950.

◆

ALLIS-CHALMERS MANUFACTURING COMPANY.—*J. D. Greensward* has been appointed manager of a newly organized apparatus department of the Allis-Chalmers Manufacturing Company. Mr. Greensward will continue also as general manager of the company's Norwood Works. The Texrope drive and pump departments, under the continuing management of *T. C. Knudsen* and *H. P. Binder*, respectively, will be operated as sections of the apparatus department.

◆

JOHN A. ROEBLING'S SONS COMPANY.—The Roebling company has moved its Los Angeles district office and warehouse to a new building at 5340 East Harbor street. The building is almost entirely of glass and red brick, and has 44,500 ft. of floor space.

◆

THOMAS A. EDISON, INC.—Thomas A. Edison, Inc., has broken ground for a new half-million dollar laboratory at West Orange, N. J. The one-story, reinforced concrete building will provide 7,400 sq. ft. of new space, with a total of 13,000 sq. ft. of space when the new structure is joined with two older buildings that are to be renovated. Construction is to be completed in about 10 months.

Obituary

ANDREW S. BUTLER, 75, president of the McDougall-Butler Company, Buffalo, N. Y., died on March 25, after a long illness.

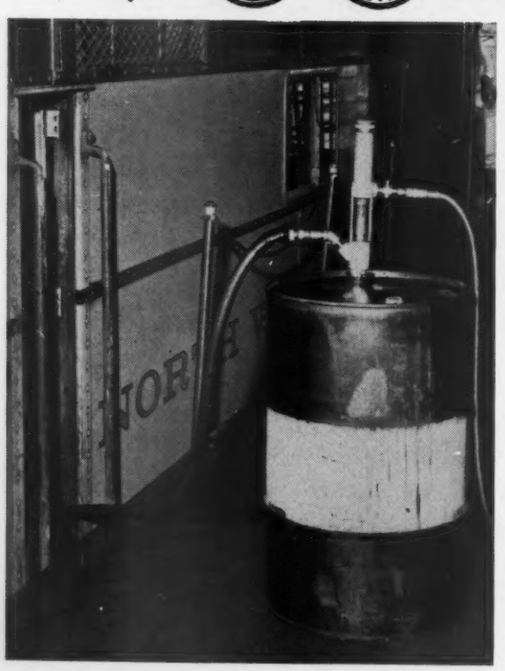
SAMUEL H. CONWELL, retired vice-president of the Standard Railway Equipment Manufacturing Company, died April 2 while vacationing in Saratoga, Cal. He had retired January 1, after 44 years' employment with the firm.

(*Continued on page 116*)

Wilkinson

High Speed Diesel Lube Oil Transfer Pump

REDUCE your Diesel lube oil handling time by more than 41% and eliminate oil spillage. Use the WILKINSON lightweight air-operated transfer pump. Only weighs 15 lbs. and *no air enters drum or oil.*



You can pump a 55-gal. barrel S.A.E. #40 lube oil in 5 minutes with only one man.

Can furnish ready-to-use, — package consisting of WILKINSON Transfer Pump, 35 feet of ¾" oil hose, and automatic shut-off valve.

HUDSON 3-5221

WILKINSON EQUIPMENT & SUPPLY CORP.

6958 South Wentworth Avenue, Chicago 21, Illinois

"Right Dress" for Diesel-Electric AUXILIARY EQUIPMENT

NATIONAL
TRADE-MARK

Standardized Brushes

ECONOMICAL maintenance demands the *best in brushes* for your diesel-electric locomotive auxiliary equipment, just as it does for diesel-electric main generators and traction motors. That's why National Carbon has standardized all down the line ... now offers you the full advantages of purchase from stock with its consequent uniform quality, low cost and quick delivery on the standardized auxiliary brushes listed below.

Like other "National" Carbon Brushes, STANDARDIZED auxiliary equipment brushes *cost less* – any way you look at it. *Uniform dependability* means lot-to-lot freedom from breakage, shunt-loosening or other brush failures. *Commutator maintenance* is reduced by service-proved grades. High electrical and mechanical *efficiency* contribute to operating economy. All together, they mean *longer brush life.*

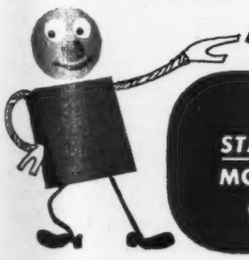
"National" Standardized Brushes for D-E Locomotive Auxiliary Equipment

BRUSH NO.	SIZE	GRADE
NC 16-3220	1¾ x 1 x ½	SA-3538
NC 16-5622	1¾ x 1¾ x ½	259
NC 20-3220	2 x .993 x .618	259
NC 08-3216	1¾ x 1 x ¼	SA-45

LOW LIGHT BILLS...

... mark phenomenal acceptance of the "EVEREADY" No. 1050 Industrial Flashlight Battery by a broad cross-section of industry. Delivering *twice the usable light* of any battery we've ever made before, it will not swell, stick, or jam in the flashlight ... has no metal can to leak or corrode.

DON'T FORGET... "NATIONAL" STANDARDIZED BRUSHES GIVE YOU A BETTER PRODUCT... IN A BETTER PACKAGE... AT A BETTER PRICE!



ADD THEM UP! THEY TOTAL THE FINEST BRUSH MONEY CAN BUY.

BUY NATIONAL *STANDARDIZED* BRUSHES FOR MOST EFFICIENT MOTOR AND GENERATOR OPERATION.

The terms "National", "Eveready", the Three Pyramids device and the Silver Colored Cable Strand are registered trade-marks of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.
District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco
In Canada: National Carbon Limited, Montreal, Toronto, Winnipeg

(Continued from page 110)

FRANKLIN L. BARBER, president of the Standard Car Truck Company of Chicago, died March 26. Mr. Barber was a former director of the Kensington Steel Division of Poor & Co.

BEST PRATT, founder and chairman of the Air Brake Equipment & Supply Co., died March 29, at the age of 76. Mr. Pratt, an authority and inventor in the air-brake field, had worked for the New York Air Brake Company, Chicago, for 22 years.

PERSONAL MENTION

Boston & Maine

F. G. FOWLER, assistant general foreman at Boston Diesel Terminal, appointed mechanical inspector at Boston.

W. B. WILLIAMS, mechanical inspector at Boston, assigned to position of mechanical inspector at Greenfield, Mass.

NORMAN PETERSON, assistant shop superintendent, Billerica, Mass., appointed assistant general foreman at Boston Diesel Terminal. Position of assistant shop superintendent abolished.

Canadian Pacific

W. A. VANDERLAND has been appointed combustion engineer, Prairie and Pacific regions, with headquarters in Winnipeg, Man.

Chicago & North Western

M. H. CRANDALL appointed assistant diesel supervisor, with headquarters at Council Bluffs, Iowa.

Elgin, Joliet & Eastern

PAUL H. VERD, superintendent motive power and equipment at Joliet, Ill., has been appointed general superintendent.

HAROLD E. NIKSCH, master mechanic at Joliet, Ill., has been appointed superintendent of motive power and equipment.

Education: Armour Institute of Technology (degree in mechanical engineering).

Harold E. Niksch

Career: Joined the Chicago, Milwaukee, St. Paul & Pacific in 1924 as a special apprentice, later holding several engineering positions. Appointed master mechanic in 1943. Joined the E. J. & E. as master mechanic in 1947.

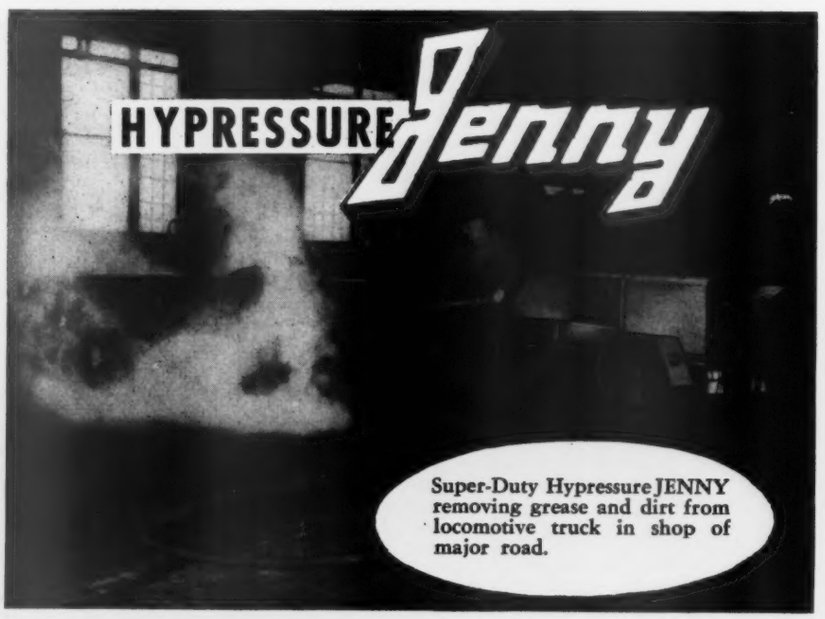
GEORGE W. BURNETT, mechanical inspector, has been appointed master mechanic at Joliet, Ill.

Erie

R. C. HULBERT, road foreman of engines, Marion division, has been appointed road foreman of engines, Meadville and B. and S. W. divisions, at Meadville, Pa.

J. W. HANK, assistant district fuel supervisor, Western district, at Meadville, Pa., has been appointed road foreman of engines, Susquehanna and Tioga divisions, with headquarters at Hornell, N. Y.

NORMAN T. EMRICK, road foreman of engines, New York division, Buffalo, and Susquehanna divisions, since November 1, 1945, has been appointed road foreman of engines, Marion division, with headquarters at Hammond, Ind.



Super-Duty Hypressure JENNY removing grease and dirt from locomotive truck in shop of major road.

Mechanized CLEANING SPEEDS SHOP ROUTINES

Hypressure JENNY Steam Cleaner gives shop schedules a big lift. By cleaning running gear parts and sub-assemblies, up to 60% production time is saved. Your skilled shopmen can get down to the job at hand without wasteful "make-ready." And Hypressure JENNY does the job in one-tenth the time that hand methods require. Other jobs include car cleaning, cleaning station and shop floors, walls, windows, etc.

JENNY, the original and only fully patented steam cleaner, is manufactured by Homestead Valve Mfg. Co. Portable, self-contained, it rolls to the job; and from a cold start, is ready for use in less than 90 seconds. Models and capacities for every railroad need.

Write for complete information.

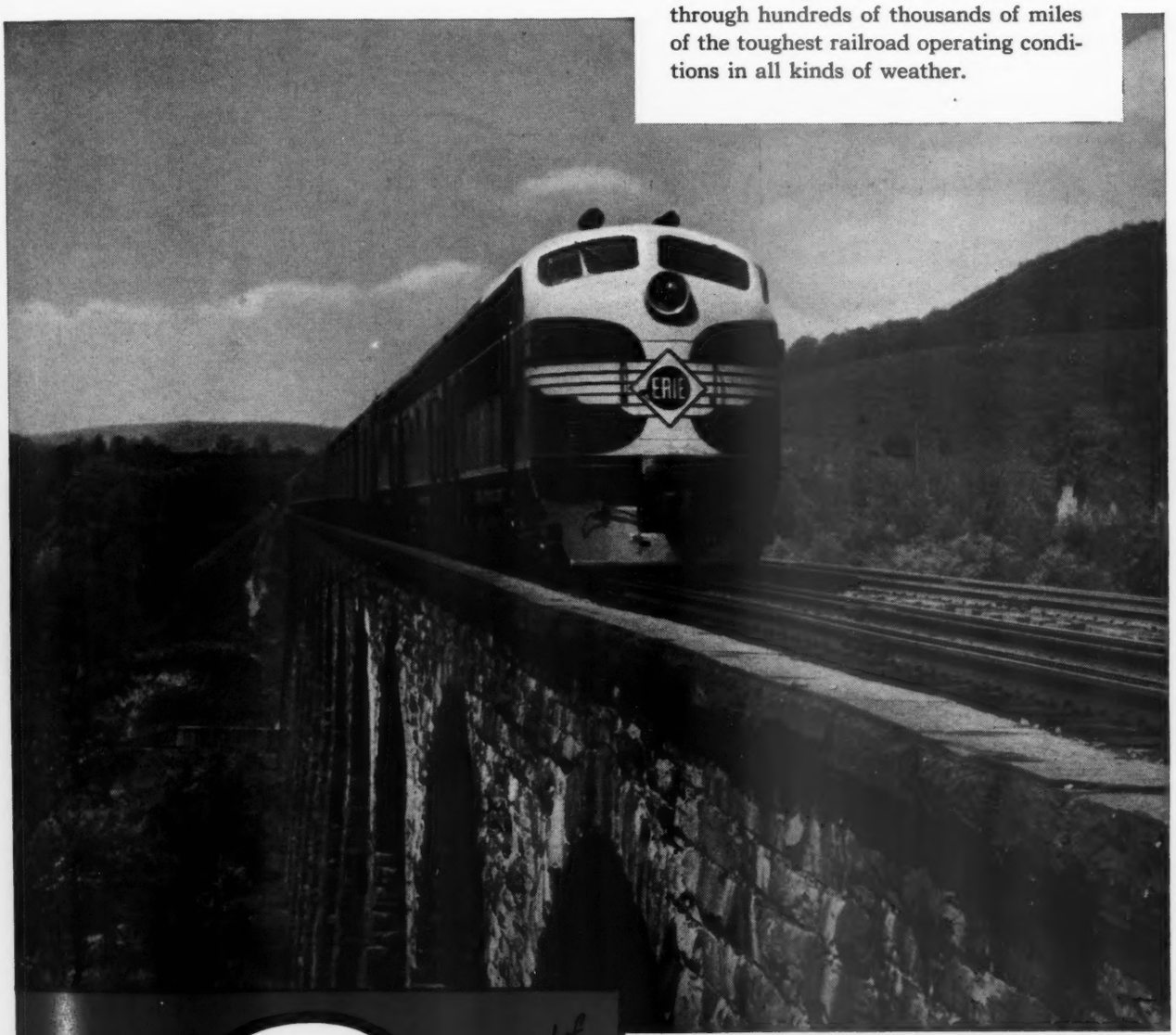
Exclusive Distributors to the Railroads

148 ADAMS AVE., SCRANTON 3, PA.

"Tailor-made"

ESSO DIESEL FUEL — is supplying sure, smooth efficient power to Diesel locomotives. Not "just another" good diesel fuel ... Esso Diesel has been specially developed into a dependable, high-quality railroad diesel fuel by years of research and testing.

PROVED ON THE RUN — by actual operation in multiple-unit Diesel locomotives through hundreds of thousands of miles of the toughest railroad operating conditions in all kinds of weather.



The Sign of QUALITY — Esso — The Symbol of SERVICE

RAILROAD PRODUCTS

SOLD [illegible]

ESSO STANDARD OIL COMPANY — Boston, Mass. — New York, N. Y. — Elizabeth, N. J. — Philadelphia, Pa. — Baltimore, Md. — Richmond, Va. — Charleston, W. Va. — Charlotte, N. C. — Columbia, S. C. — Memphis, Tenn. — New Orleans, La.

PROVED IN THE LAB ... research by a staff of over 2000 scientists and technicians in America's largest petroleum laboratories makes *sure* that Esso Diesel Fuel gives powerful performance in any Diesel locomotive.

PROVED ON THE JOB — Esso Sales Engineers make sure that every Esso Railroad Product is performing up to *your* satisfaction. Be sure to call on an Esso Sales Engineer any time for help with your fuel and lubricating problems.

Air-Push, too, is "Poised for Action" . . . always ready with positive power to instantly clear your windshields. Your crew, your cargo, and your equipment deserve the best — there is no economical substitute for quality! Sprague Air-Push windshield wipers have been faithfully serving the railroad industry for over 20 years. Write today for full information about this important safety equipment!

Sprague

DEVICES, INC.

Michigan City, Indiana

MANUFACTURERS OF THE FAMOUS

AIR-PUSH WINDSHIELD WIPERS

H. D. McConahy, division car foreman at Meadville, Pa., has been appointed division car foreman at Marion, Ohio.

R. Knorr, division car foreman at Marion, Ohio, has retired.

C. H. Schueler has been appointed division car foreman at Meadville, Pa.

Missouri-Kansas-Texas

J. L. Rouch, general foreman of the Parsons, Kan., locomotive shops, has been appointed superintendent of the Warden locomotive shops at Waco, Tex.

New York Central

G. M. Schmidbauer has been appointed superintendent of shop (car) at West Albany, N. Y.

C. H. Mendler, superintendent of shop (car) at West Albany, N. Y., has retired.

C. M. Ferguson appointed special inspector, with headquarters at Detroit.

Norfolk & Western

F. H. Wilbourne, foreman at Iaeger (W. Va.) shop, has been appointed assistant road foreman of engines, Radford division.

S. L. Wohford, gang foreman at Petersburg, Va., has been appointed foreman at Iaeger (W. Va.) shop.

George E. Payne, night roundhouse foreman at Shaffers Crossing (Va.) shop, has been appointed general foreman at Winston-Salem, N. C.

Dewey E. Grayson, assistant roundhouse foreman, Shaffers Crossing (Va.) shop, has been appointed night roundhouse foreman at Shaffers Crossing.

E. C. Crowder, Jr., gang foreman, has been appointed assistant roundhouse foreman, Shaffers Crossing (Va.) shop.

Pennsylvania

J. E. Wightman, superintendent motive power—diesel, Central Region, appointed superintendent, Lake division.

G. R. Weaver, master mechanic, Maryland-Delmarva divisions, appointed superintendent motive power—diesel, Central Region.

W. H. Yarber, assistant master mechanic, Philadelphia division, appointed master mechanic, Lake division.

A. O. Taylor, master mechanic, Lake division, appointed master mechanic Pittsburgh and Conemaugh divisions.

W. H. Weaver, foreman, Pitcairn steel shop, Pittsburgh division, appointed assistant master mechanic, Pitcairn, Pa., Pittsburgh-Conemaugh divisions.

H. L. Wood, assistant foreman, 59th street enginehouse, Chicago, appointed master mechanic, Philadelphia division.

for QUICK, CLEAN, UNIFORM HEAT at LOW OPERATING COST—

JOHNSTON SLOT-TYPE FORGING FURNACES

★ OIL OR GAS FIRED

★ SINGLE OR MULTIPLE SLOT TYPES

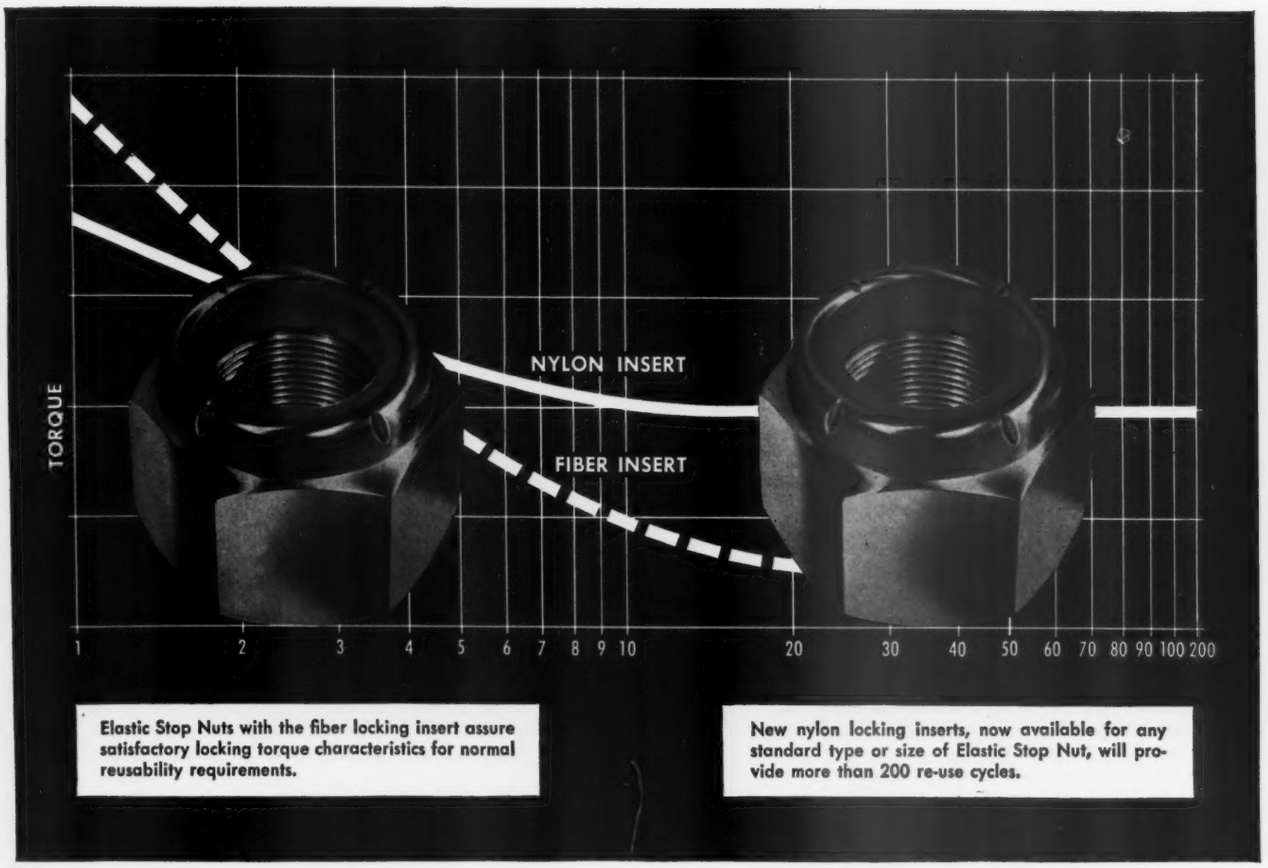
This furnace will maintain uniform neutral or reducing atmosphere for forging and welding which will avoid scale and decarburization. Construction features water, refractory or cast iron shields. Fire brick and insulating refractory brick lining with chrome refractory hearths are new features to reduce maintenance and operating costs and speed production.

★ BURNERS ★ BLOWERS ★ FURNACES ★ RIVET FORGES
★ FIRE LIGHTERS ★ TIRE HEATERS, ETC.

THE JOHNSTON LINE — SAFETY DEPENDABILITY

JOHNSTON MANUFACTURING CO.
2825 EAST HENNEPIN AVE.
MINNEAPOLIS 13, MINN.

ENGINEERS & MANUFACTURERS OF INDUSTRIAL HEATING EQUIPMENT


TORQUE
NYLON INSERT
FIBER INSERT
1 2 3 4 5 6 7 8 9 10 20 30 40 50 60 70 80 90 100 200
Elastic Stop Nuts with the fiber locking insert assure satisfactory locking torque characteristics for normal reusability requirements.
New nylon locking inserts, now available for any standard type or size of Elastic Stop Nut, will provide more than 200 re-use cycles.

How do you measure Reusability?

UP TO FIFTEEN TIMES?

For assemblies that must be locked in place, Elastic Stop Nuts with fiber locking inserts guarantee a permanently secure grip—plus ample reusability to cover most normal maintenance requirements.

For assemblies that must be disassembled and reassembled five, eight, ten, or more times during normal use, fiber insert Elastic Stop Nuts make the ideal self-locking fastener.

When an Elastic Stop Nut is run on a bolt, the Red Elastic Collar hugs the bolt—actually makes a skin-tight fit against the entire contact length of the threads—and this controlled torque firmly resists vibration or shock. When the Elastic Stop Nut is removed from the bolt, the natural resiliency of the Red Elastic Collar is your guarantee of continuing torque when the nut is reapplied.

MORE THAN FIFTEEN TIMES?

Now, for assemblies that require constant adjustment or frequent disassembly for checking and maintenance, ESNA offers all standard types and sizes of Elastic Stop Nuts with the new nylon locking inserts.

Reusable up to 200 times with remarkably constant torque characteristics, these new Elastic Stop Nuts offer the one-piece construction, the shock resistance, and the moisture-seal features that many manufacturers now depend upon in the standard Elastic Stop Nuts.

One of these Elastic Stop Nuts is probably the solution to your most troublesome fastener problem. It will pay you to look into the self-locking performance of Elastic Stop Nuts. For information, write for a new, free booklet. **Elastic Stop Nut Corporation of America,** 2330 Vauxhall Road, Union, New Jersey, Dept. N5-523.

ESNA
TRADE MARK

ELASTIC STOP NUTS

HIGH TENSILE

ANCHOR

HIGH TEMPERATURE

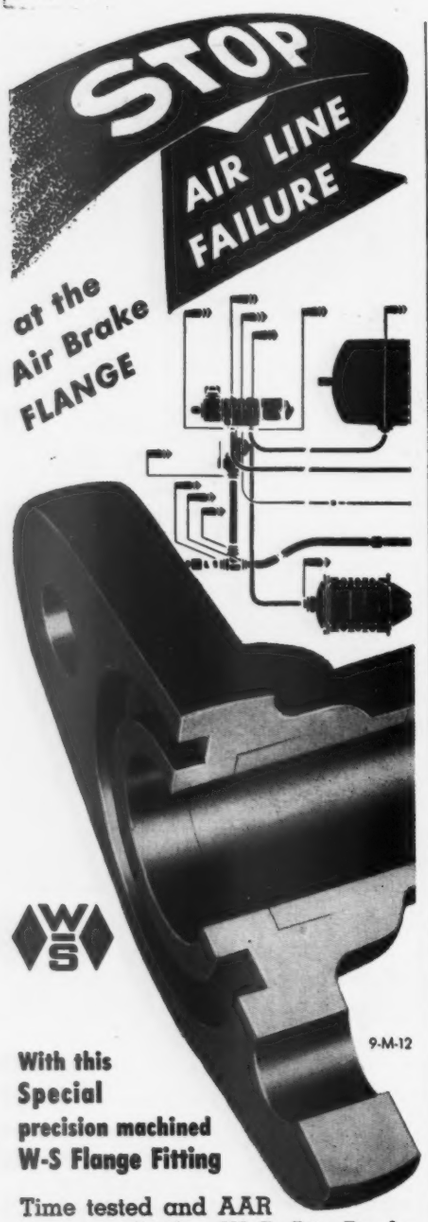
SPLINE

CLINCH

GANG CHANNEL

NYLON CAP

NYLON AND FIBER INSERT TYPES ARE QUALIFIED TO SPEC. AN-N-5



With this Special precision machined W-S Flange Fitting

Time tested and AAR approved, the W-S Air Brake FLANGE is now standard equipment on thousands of cars — on many roads. It cuts the number of piping failures on air-brake systems . . . keeps rolling stock in service.

Drop forged for strength . . . it's lighter in weight, less cumbersome to handle because it's made in one piece. And, when positioned and welded, is shock and fatigue resistant.

Not one single failure reported in over 5 years of service . . . test it yourself and be convinced. Write for Bulletin R-1 to get more information.

DISTRIBUTOR PRODUCTS DIVISION

WATSON-STILLMAN

ROSELLE, NEW JERSEY

W. H. MEIER, enginehouse foreman, Cresson, Pa., Pittsburgh division, appointed enginehouse foreman, Conemaugh, Pa., Pittsburgh division.

W. J. CLARK, assistant enginehouse foreman—first trick, Shire Oaks, Pa., Pittsburgh division, appointed enginehouse foreman, Cresson, Pa., Pittsburgh division.

W. H. TURNBULL, JR., gang foreman, East Altoona enginehouse and acting foreman, Osceola enginehouse, appointed foreman, Osceola enginehouse.

E. GARNER, foreman, Terre Haute car shop, Southwestern division, appointed foreman, Pitcairn steel shop, Pittsburgh division.

J. E. STOVER, assistant enginehouse foreman—relief, 28th street, Pittsburgh, Pittsburgh division, appointed assistant enginehouse foreman—diesel, Pitcairn, Pa., Pittsburgh division.

H. L. KER, assistant enginehouse foreman, Erie, Northern division, appointed assistant enginehouse foreman—relief, 28th street, Pittsburgh, Pittsburgh division.

A. V. OAKLEY, gang foreman, Pittsburgh division, appointed assistant enginehouse foreman, Erie, Northern division.

W. R. TROXELL, gang foreman 28th street engine house, Pittsburgh division, appointed assistant enginehouse foreman—second trick, Shire Oaks, Pa., Pittsburgh division.

A. M. SCHULER, assistant enginehouse foreman—second trick, Shire Oaks, Pa., Pittsburgh division, appointed assistant enginehouse foreman—first trick, Shire Oaks, Pa., Pittsburgh division.

Seaboard Air Line

R. W. ROGERS, chief mechanical officer at Norfolk, Va., is serving temporarily as director of the Railroad Division of the National Production Authority. He will be in Washington until early fall.

H. S. MERCER, assistant chief mechanical officer, is serving as acting chief mechanic officer at Norfolk, Va.

O. G. WOOD, JR., foreman of the car and locomotive department at Monroe, N. C., has been appointed supervisor car department at Raleigh, N. C.

Union Pacific

J. D. KILLIAN, master mechanic, Oregon division, Portland, Ore., appointed mechanical superintendent for steam power at Omaha, Neb.

Born in Ava, Ill., 1897.

Career: Joined U. P. in 1915 as machinist helper at Rawlins, Wyo. Served at posts in Nebraska, Colorado, Idaho, and California, rising through several supervisory positions in mechanical department. Appointed master mechanic in 1949.

PERSONAL MENTION—*Obituaries*

PETER KASS, retired superintendent car department for the Chicago, Rock & Pacific, died at his home in Chicago March 23.

J. E. WEISER, general foreman of the Norfolk & Western at Winston-Salem, N. C., died on February 4.

NEW DEVICES

(*Continued from page 94*)

nounced by the Illinois Bronze Powder Company, Chicago 6.

This product named Hi-Temp is a formulation of aluminum powders in a special vehicle. It is said to insure protection against peeling, discoloring, blistering and other problems caused by high heat.

Hi-Temp is recommended for railway and industrial uses including furnace fronts, boilers, engines, steam pipes, etc. No special surface preparation is needed, one coat will cover by brush or spray application. It dries in one to two hr.

◆

Spray Gun Supply Pump

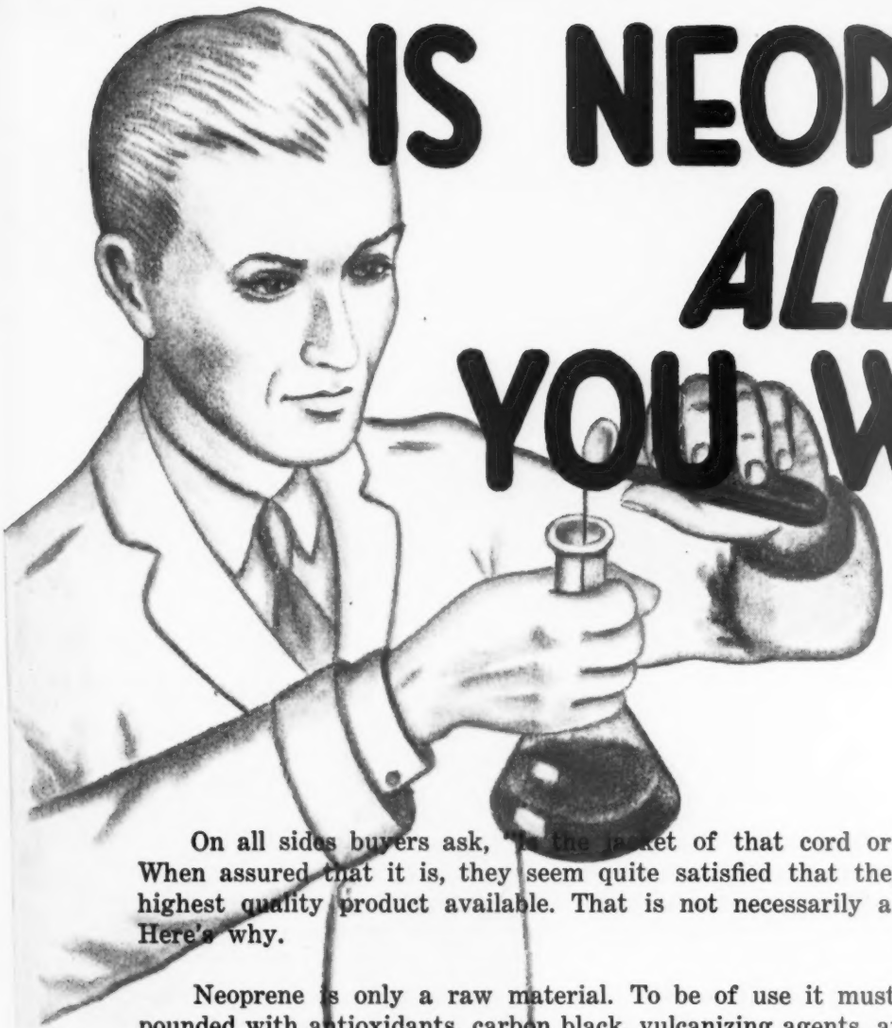
A heavy duty unit featuring an air-operated pump for handling the new-type coatings, heavy paints and many other fluids has been announced by The Gray Company, Inc., Minneapolis 13, Minn. These air-oper-

APEX INSERTED-BLADE METAL-CUTTING TOOLS

APEX TOOL BITS FIT MOST STANDARD HOLDERS

If you haven't yet changed to Apex, you can begin to get acquainted by using Apex Bits in your present holders. The Apex line includes Single-Point Round Shank (as shown) and Shankless Serrated — plus Inserted-Blade Milling Cutters of all different styles. Write for catalog.

APEX TOOL & CUTTER CO., INC.
SHELTON 21, CONNECTICUT



IS NEOPRENE ALL YOU WANT ?

On all sides buyers ask, "Is the jacket of that cord or cable neoprene?" When assured that it is, they seem quite satisfied that they are getting the highest quality product available. That is not necessarily a sound conclusion. Here's why.

Neoprene is only a raw material. To be of use it must be **properly** compounded with antioxidants, carbon black, vulcanizing agents, and other materials. In other words, technical skill in properly compounding neoprene is just as important as using neoprene itself.

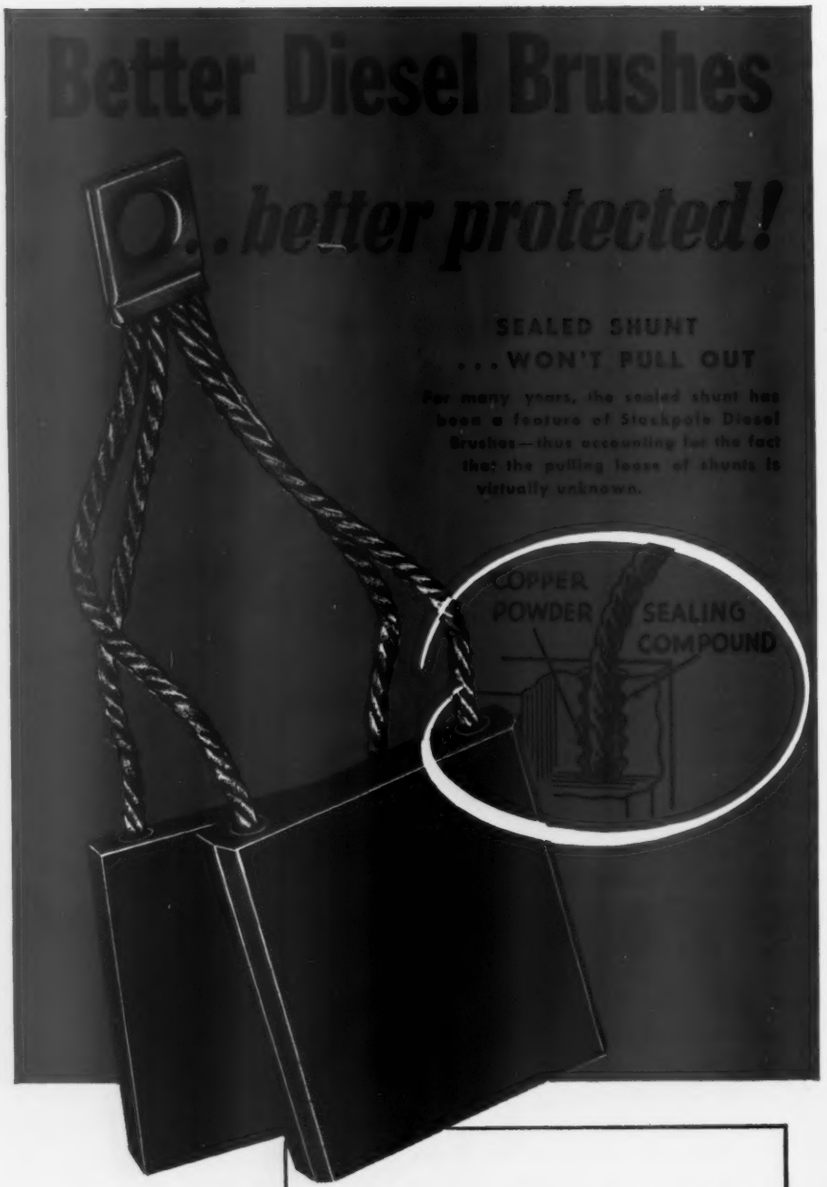
TIREX Cords and Cables were the first to be made in this country with a heavy duty jacket. Proof of the fact that compounding skill is important is shown by the fact that in the intervening thirty years TIREX has kept the leadership in the field of portable cords and cables. Simplex skill developed the cords and then kept them leaders against all comers.

The next time you need a portable cord or cable specify and be sure you get Simplex-TIREX Cords and Cables. The name is embossed on the jacket for your protection.

SIMPLEX-TIREX IS A PRODUCT OF SIMPLEX RESEARCH

SIMPLEX TIREX

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

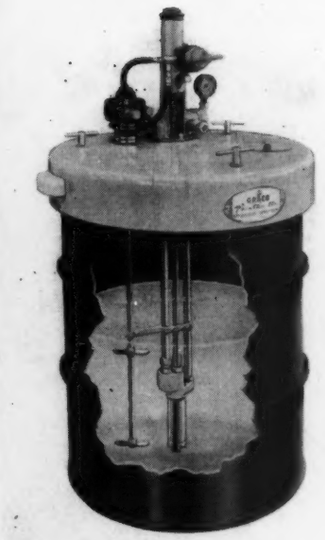

Better Diesel Brushes
...better protected!
SEALED SHUNT
...WON'T PULL OUT
For many years, the sealed shunt has been a feature of Stackpole Diesel Brushes—thus accounting for the fact that the pulling loose of shunts is virtually unknown.
COPPER POWDER
SEALING COMPOUND

From raw materials to finished product, every Stackpole brush is QUALITY CONTROLLED for top-notch on-the-job performance.

STACKPOLE CARBON COMPANY
St. Marys, Pa.

STACKPOLE

BRUSHES FOR ALL ROTATING ELECTRICAL EQUIPMENT • BEARING MATERIALS BRAZING FURNACE BOATS • CARBON PILES • CLUTCH RINGS • CONTINUOUS CASTING DIES • DASH POT PLUNGERS • FRICTION SEGMENTS • RAIL BONDING MOLDS • RESISTANCE WELDING AND BRAZING TIPS • SEAL RINGS • TROLLEY AND PANTOGRAPH SHOES . . . *and dozens of carbon-graphite specialties.*



ated, double action reciprocating pumps, known as Paintmasters, are designed for supplying long-line circulating systems and multiple spray guns.

The circulating system in the unit delivers paint directly to the spray head and back through the supply lines. The dual-blade, air-operated rotary agitator features twin blades adjustable to any depth. A micrometer-type adjustment provides a full range of agitating speeds independent of paint pump operation.

With the circulating system, fire hazards can be reduced if the units are housed in a fireproof control room. Explosion hazards due to excessive air pressures are removed because no pressure vessel is used.

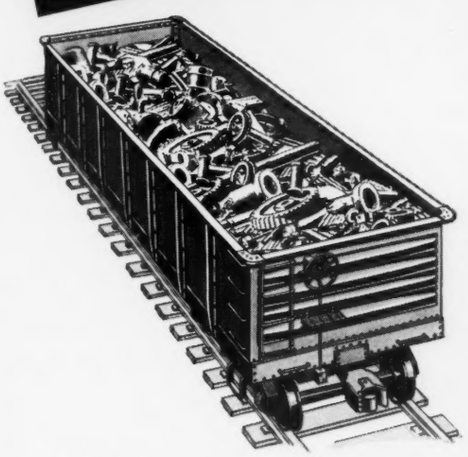
◆

Over-spray paint being peeled off the wall of a spray booth

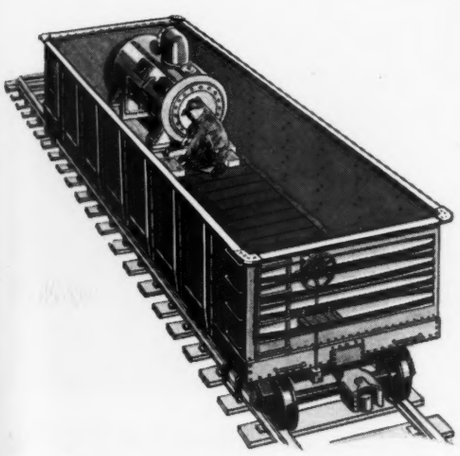
Coating for Paint-Spray Booths

A new vinyl-type paint spray booth coating material called Vincote, has been placed on the market by Detrex Corporation, Detroit 32, Mich. The material was developed for

WHY USE TWO ... WHEN ONE WILL DO?



Inbound gondola carrying scrap may have a steel plate floor to which outbound finished freight cannot be blocked.



Result: a *second* car with a different type flooring, to which finished freight *can* be blocked, is often needed.

"GONDOLAS: Shortages are being reported by all principal railroads..."
—Bulletin No. 80, 1-21-52
AAR Car Service Division

Gondolas equipped with NAILABLE STEEL FLOORING do double duty. Floored with steel, yet nailable . . . they can deliver rough freight and carry away finished freight which must be blocked. And, of course, the reverse is equally true. Cars equipped with N-S-F thus make possible less switching and deadheading of empties which, in turn, reduce operating costs—improve car supply.

Formed of tough N-A-X HIGH-TENSILE steel, N-S-F takes nails easily without damage to the floor . . . provides security for blocked and skidded loads . . . assures extra revenue years of service.

N-S-F HOLDS BLOCKING BETTER — A GREAT LAKES STEEL PRODUCT

PATENTS PENDING

Sales representatives in Chicago, Philadelphia, St. Louis, Atlanta, Omaha, Denver, San Francisco, New York and Montreal.

GREAT LAKES STEEL CORPORATION
STEEL FLOOR DIVISION • Ecorse, Detroit 29, Michigan

PRODUCER OF N-A-X HIGH-TENSILE STEEL

NATIONAL STEEL CORPORATION

52-SF-3

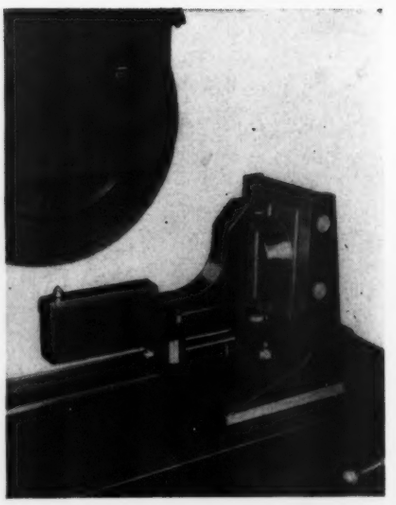
use on the side walls of both water-wash and dry paint spray booths. It possesses rapid drying properties and when sprayed on a booth wall forms a tough plastic film. It is not affected by enamel, lacquer and water.

The low adhesive properties of the material serve to simplify booth maintenance. When the paint over-spray has built up to a point where its removal is indicated, the coating and all over-sprayed paint is peeled off in large, easily removed sheets. Vincote also makes it unnecessary to use such hazardous materials as grease, paper, etc., on spray booth walls. It can be applied to booth walls with any standard spray equipment. A gallon of the material will cover from 275 to 400 sq. ft., depending upon the desired thickness.

◆

Grinding Wheel Dresser

A wheel dresser for the dressing of any wheel up to 36 in. in diameter has been developed. It maintains an accuracy of 0.0001 in. up to 14 in. diameter wheels and to 0.0005 in. on 36 in. wheels. This unit, coupled with a newly developed fixture for under the wheel dressing, is marketed by the J & S Tool Co., Inc., East Orange, N. J., as the Fluid-motion dresser.

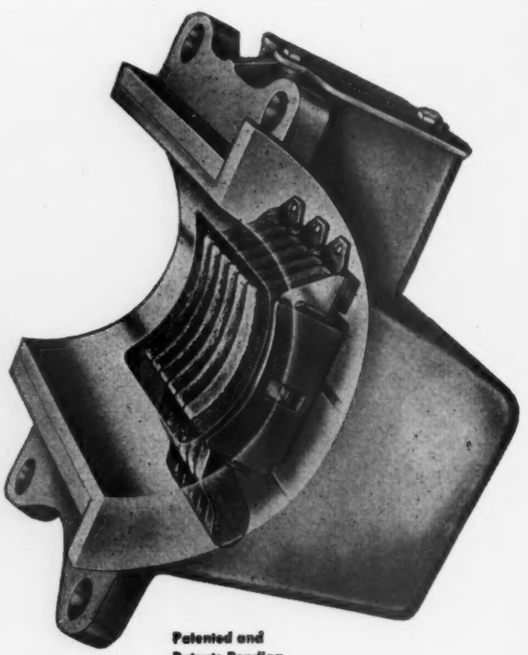


This unit can be adapted to cylindrical, tool and cutter grinders, as well as internal grinders. A series of fixtures converts it from a surface grinder wheel dresser to use on any other cylindrical type grinder.

The device dresses 2 angles tangent to a radius in one continuous motion with 0.0001 in. accuracy without the use of dovetails. These angles are dressed by continuing to push the handle in either or both directions after radius is formed. The diamond automatically returns to center position after dressing angles.

The dressers are made of alloy steels resistant to abrasive action, and are available in smaller size models with or without special fixtures and micrometer feed.

◆



ELIMINATE *Costly* HAND PACKING...

Patented and Patents Pending

Convert your Old Fashioned yarn packed caps with... FELPAX *Lubricators*

It's Easy!!!

JUST 3 SIMPLE STEPS

1. Remove yarn pressure plate, (replace with mounting plate when necessary).
2. Fasten factory assembled Felpax carrier into place in axle cap.
3. Insert matched set of wicks.

Modern FELPAX Lubricators require only periodic checking and filling of the oil sump. You can cut maintenance labor to a minimum, eliminate costly waste grabs and starved bearings and reduce wheel change-outs due to excessive thrust wear.
FELPAX Lubricators give tens of thousands of miles of dependable lubrication on diesel traction motor suspension bearings. Lubricators may be completely reconditioned in the field with easy-to-install factory matched wick sets that are available at a nominal cost.

For Full Information about conversion to Modern FELPAX Lubricators see your locomotive builder or write to:

MILLER FELPAX CORPORATION
WINONA, MINNESOTA

Flexible Electrical Tubing

A type of electrical tubing, said to possess exceptional flexibility and heat endurance, has just been announced by the Irvington Varnish and Insulator Company, Irvington, N. J. It is known as Silicone Rubber Coated Fiberglas Tubing, is a Class H product, and is said to withstand an exposure of 200 hr. at 200 deg. C. without embrittlement.

This tubing is manufactured by using selected sizes of glass braid, which are coated with silicone rubber using a special multiple coat process to insure uniform coating and roundness. It will meet performance requirements of government specification Mil-1-3190 on Class H materials.